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TRANSACTIONS OF THE

SECTION ON

Obstetrics *and* Diseases of Women

of the
American Medical Association
at the Sixty-First Annual
Session, held at St. Louis,
Mo., June 7 to 10, 1910

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LIST OF OFFICERS

The officers named below have served this Section. That division of practice included under the title of "Obstetrics and Diseases of Women" was formerly included with branches which now comprise separate sections. The names have been taken from the published records, which are deficient in some cases. It will be appreciated if any additional data are brought to the attention of the Secretary of the American Medical Association.

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PROCEEDINGS OF THE SESSION

Tuesday, June 7—Afternoon

The Section was called to order at 2 p. m., in Association Hall, Y. M. C. A. Building, by the Chairman, Dr. John G. Clark, Philadelphia.

Dr. William S. Gardner, Baltimore, read a paper on "Infections of the Endometrium." Discussed by Dr. Novak.

Dr. Henry O. Marcy, Boston, read a paper on "The Plastic Surgery of the Pelvic Structures." Discussed by Drs. Gilliam, Gilbert, Hayden, Hall, Shoemaker, Glasgow, Rosenthal, Hinchey and Marcy.

Dr. Sidney A. Chalfont, Pittsburg, read a paper on "Arteriosclerosis of the Uterine Vessels." Discussed by Drs. Novak and Foulkrod.

Dr. Samuel Wyllis Bandler read a paper on "An Ideal Operation for the Cure of Total Prolapse of the Uterus." Discussed by Drs. Carstens, Goffe, Lawrence, Baldy and Bandler.

Dr. George Erety Shoemaker read a paper on "Papillary Cystadenoma of the Kidney, Associated with Myoma of the Uterus and Spinal Caries." No discussion.

Dr. J. H. Carstens read a paper on "Uselessness of Local Treatment in Puerperal Sepsis." Discussed by Drs. Zinké, Wetherill, Boldt, Glasgow, Schwartz and Carstens.

Wednesday, June 8—Morning

The following papers were read and discussed as a symposium by inventors of operations for retroflexion of the uterus:

Dr. R. C. Coffey, Portland, Ore.: "Plication of the Round and Anterior Fold of the Broad Ligament on the Anterior Surface of the Uterus for Retrodisplacement."

Dr. J. M. Baldy, Philadelphia: "Attachment of Ligaments Posterior to the Uterus."

Dr. D. Tod Gilliam, Columbus, O.: "Intraperitoneal Implantation of Round Ligaments."

Dr. F. F. Simpson, Pittsburg, Pa.: "Intraperitoneal Shortening of Round Ligaments (Simpson Operation)."

Dr. A. Goldspohn, Chicago: "Shortening of the Round Ligaments Via the Temporarily Dilated Inguinal Canals Combined with the Bassini Technic in Closure of the Wounds."

Dr. E. C. Dudley, Chicago: "Resumé of the Surgical Treatment of Retrodeviations of the Uterus."

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These six papers were discussed by Drs. Montgomery, Murphy, Boldt, Carstens, Barrett, Marcy, Wathen, Massey, Gellhorn, Byford, Baldy, Gilliam and Simpson.

Wednesday, June 8—Afternoon

The meeting was called to order at 2 p. m. by the Vice-Chairman, Dr. C. C. Frederick, Buffalo.

Dr. John G. Clark, Philadelphia, read his Chairman's Address entitled "Embryologic and Anatomic Causes for Obstinate Constipation in Women; Operative Methods for Relief." Dr. E. E. Montgomery of Philadelphia moved that a vote of thanks be given Dr. Clark for his very able presentation. Seconded and carried.

The following five papers were read and discussed as a Symposium on Enteroptosis:

Dr. Richard R. Smith, Grand Rapids, Mich., read a paper on "Enteroptosis, with Special Reference to Its Etiology and Development, and Remarks on the Results of Examination of 400 Women, with Reference to This Condition."

Dr. E. H. Skinner, Kansas City, Mo., read a paper on "The *X*-Ray in the Diagnosis of Enteroptosis."

Dr. A. W. Crane, Kalamazoo, Mich., read a paper on "Value of the Roentgen Ray in Enteroptosis."

Dr. John H. Musser, Philadelphia, read a paper on "The Physician's Viewpoint."

Dr. A. J. Ochsner, Chicago, read a paper on "The Surgical Viewpoint."

These five papers were discussed by Drs. Einhorn, Coffey, Korsell, Carstens and Crane.

Thursday, June 9—Morning

The Nominating Committee reported the following nominations: Chairman, Dr. Horace G. Wetherill, Denver; Vice-Chairman, Dr. Fred J. Taussig, St. Louis; Secretary, Dr. C. Jeff Miller, Louisiana; Delegate, Dr. A. E. Benjamin, Minnesota; Alternate, Dr. S. W. Bandler, New York.

The report was accepted and the nominees were elected.

Report of Cancer Committee

The report of the Cancer Committee, consisting of Dr. Horace G. Wetherill, Denver, chairman, and Drs. Henry Schwarz, St. Louis, and John G. Clark, Philadelphia, was read and accepted. It was as follows:

A resolution introduced by Dr. Walter B. Dorsett of St. Louis, and approved by the Section on Obstetrics and Diseases of Women at the last meeting at Atlantic City, directs your committee:

1. To confer with the Committee on Public Instruction of the House of Delegates [now absorbed into the new Council on Health and Public Instruction].

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2. To formulate plans of campaigning against cancer.
3. To report the result of their work at this session.

Dr. John G. Clark, chairman of the Board of Public Instruction, and also a member of this committee, directs our attention to a report of a similar committee of this Section made at the Boston session of the American Medical Association in 1906, and suggests that we "prepare a plan which may be submitted to the Board of Public Instruction in time for consideration at the session in St. Louis."

Your committee recommends an active educational campaign along the lines indicated in the excellent report of the committee of 1906, and inasmuch as no new pathognomonic sign or symptom of cancer, or successful new treatment for it, has been discovered since that report was made, we can only urge anew that our Section cooperate with the Board of Public Instruction in an energetic effort to educate women to an appreciation of the known early signs of cancer and the importance of an examination by a competent physician, on the one hand, and that on the other hand, we exhaust all available resources in an endeavor to impress on every member of our profession his personal responsibility for an early and accurate diagnosis of cancer, and a timely removal of the growth by a competent surgeon.

Briefly formulated, the points to be kept in mind are the following:

1. Cancer in the female is mostly cancer of the breast and cancer of the uterus.
2. Both forms of cancer are curable.
3. Curability depends at present on early diagnosis and early operation.

The measures which we should advocate must be two-fold: We must find ethical means of informing the public of the fact that cancer is curable, and of the necessity of submitting to an early examination. This information could be issued by the American Medical Association through a central bureau of information.

We must further educate the medical profession to a full understanding of the present status of the curability of cancer and cover the following points:

1. The necessity of early competent local examination of all suspicious cases (especially on return of the menses after the menopause).
2. The necessity of obtaining material by curettage or trial excision for microscopic diagnosis.
3. The necessity of placing these cases in competent hands, and the wrong toward the patient that is committed, when her doctor temporizes with a suspected case.
4. The necessity of furnishing honest and reliable statistics.

These could be furnished by the American Medical Association through the county societies.

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If we institute a campaign for early diagnosis and early operation, we should at the same time agitate against late operations, with misrepresentation of statistics.

The methods employed in the educational campaign of the National Association for the Study and Prevention of Tuberculosis, or the publicity given the discussion of the dangers of delayed operations and the safety and low mortality of early operations for appendicitis, with certain modifications, might be applied to a cancer campaign. The popular tendency to conceal cancer as a loathsome and incurable disease of which one may feel ashamed, and the belief that it comes only through heredity, must be educated out of the people, just as similar views regarding tuberculosis have been educated out of them.

Each physician must become a missionary to preach and teach the primary local origin of cancer and the possibility of a cure through an early diagnosis and operation while the disease is local. In this effort, national, state, county and city health bodies must cooperate, and our cabinet health officer (when appointed) should collect detailed statistics and issue official educational bulletins regarding it.

Women's organizations of large membership and of national scope might be made the mediums through which an educational propaganda could be established. One organization in particular, the National Congress of Mothers, is devoted solely to the consideration of questions associated with motherhood. It is organized in thirty-four states and has many thousands of members who should be interested and ultimately become our allies.

Many effective educational units could so be added to our working force. The propriety and fitness of such an alliance would commend itself to every one, as in women the disease in question most often invades the organs directly involved in motherhood, and it frequently has its origin in the scar tissue incident to injuries received during childbirth.

Scientific pediatrics, quarantine, preventive medicine, serum therapy and timely surgery have so reduced the mortality of childhood and early life that the relative and absolute mortality of the later years is increased beyond any figure heretofore attained, and of this increase, deaths from cancer constitute an actual as well as a relative disproportion which is truly alarming.

Until something better is given to the world we must rely on the clinical experience of the past, and we can hope for satisfactory results only through early diagnosis and the complete removal of the primary local focus of the disease.

Dr. J. Riddle Goffe, New York City, read a paper on "Tuberculosis of the Female Organs of Generation and the Peritoneum." Discussed by Drs. Novak, Frederick, Gilmore, Byford, Gilliam, A. Miles Taylor, and Goffe.

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The following four papers were read and discussed as a Symposium on Carcinoma of the Uterus:

Dr. John A. Sampson, Albany, N. Y.: "The Participation of the Glandular System and Tissues Adjacent to the Uterus in Carcinoma of the Uterus."

Dr. J. H. Jacobson, Toledo, O.: "The Results Obtained by the Radical Abdominal Operation for Carcinoma of the Uterus."

Dr. Emil Ries, Chicago: "The Diagnosis of Operability of Carcinoma of the Cervix of the Uterus."

Dr. C. C. Frederick, Buffalo, N. Y.: "Further Observations on the Use of the Cautery in the Treatment of Carcinoma of the Uterus."

These four papers were discussed by Drs. Gellhorn, Peterson, Goldspohn, Mosier, Wetherill, Jacobson and Ries.

Thursday, June 9—Afternoon

The Vice-Chairman, Dr. C. C. Frederick, Buffalo, N. Y., called the meeting to order at 2 p. m.

Dr. Channing W. Barrett, Chicago, read a paper on "The Place of Hebosteotomy as an Aid to Delivery." Discussed by Drs. Zinke, Foulkrod, Fry, Burns and Barrett.

Report of Committee on Pharmacopeia

The report of the Committee on Revision of the Pharmacopeia was presented, and on motion adopted. It was as follows:

On Dec. 19, 1909, Dr. John G. Clark, chairman of the Section, appointed the undersigned committee to suggest such changes in the Pharmacopeia as the experience of gynecologists and obstetricians throughout the country would seem to justify. The preliminary report of the results of our investigation was presented on April 30, in order that the information gained might be utilized at the meeting of the Pharmacopeial Convention, held May 10, at Washington.

In order that the recommendation of this committee might go to the Pharmacopeial Convention, not merely as the opinion of one or two members, but as an expression of the approval or dissent of several hundred members of this Section, it was decided to employ the return-postal ballot to find out what was the opinion of the majority. Through the generosity of The Journal of the American Medical Association the necessary printing and mailing was done without any expense to the Section. In order that all the members might vote with an intelligent understanding of the important points involved, there was sent to each member the following circular:

"It would be manifestly unjust and unwise to include in our Pharmacopeia any preparation whose name is trademarked or

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whose mode of manufacturing is patented. To obviate this very serious drawback in our copyright laws, we must employ the expediency of introducing these substances into the Pharmacopeia under new names.

"Your committee has therefore deemed it wise for you to express your opinion, not, for instance, on the relative merits of ergone, ergotol, ernutin, etc., but on the desirability of a purified concentrated preparation of ergot. If the physicians of the country think such a preparation a necessity, it becomes the duty of the committee on Revision of the Pharmacopeia to suggest a method of manufacture, standard tests, and a suitable name. What applies to ergot is true of the other preparations concerning which you are asked to express your opinion. The technical difficulties regarding an accurate method of standardization can be safely left to the Committee on Revision. What your committee desires to know is which of these preparations have so far proved their usefulness as to justify inclusion in the Pharmacopeia."

Owing to the large number of members of this Section THE JOURNAL felt that it would suffice to send the circular and postal card to every other member on the list of membership. Of the 500 communications thus sent out, replies were received from 196. The interest shown in the subject is indicated, not merely by the number of replies, but by the care taken in the consideration of each special topic brought up for discussion. In many instances, the vote was not merely expressed by "yes" or "no," but by additional comments. An analysis of the vote cast is as follows:

1. A purified concentrated preparation of ergot for hypodermic use.

The vote on this question was, 182 yes; 13 no; not voting, 1. Which one of the various methods in isolating the active principle of ergot will prove to be best is a question to be determined by the members of the Committee on Revision. The essential thing is that the preparation shall be free from inactive or irritating substances; that it should be aseptic and concentrated, so as to be suitable for hypodermic use, and that physiologic standards should be required to test its efficiency.

2. A non-irritating silver solution. The vote was 186 yes, 7 no, and 3 not voting. The irritation caused by the injection of silver nitrate in cases of cystitis, and in the prophylactic measures employed against ophthalmia of the new-born has led practitioners to favor the less irritating silver solutions, such as argyrol, argentamin, etc. It would seem that considerable difficulty will be found in establishing accurate chemical tests for the proper manufacture of such a preparation of silver, but that it is wanted by the profession is clearly shown by the vote.

3. A liquid preparation of the adrenal gland. The vote was 185 in favor, 5 against, and 6 not voting. Physiologic

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tests will be required to determine the efficacy of this product also.

4. A preparation of cotarnin. The fact that 31 of the replies left this question unanswered would indicate that a considerable preçentage of the profession is still ignorant of its value as a uterine hemostatic. Nevertheless, the fact that of the remaining 165 votes, 123 favored the introduction of this substance into the Pharmacopeia, and only 42 opposed it, would justify its recommendation by the committee.

5. A less toxic form of cocain. There seemed to be practical unanimity of opinion regarding this substance. One hundred and seventy-six favored its introduction, 12 opposed it, and 8 did not vote. The great number of preparations of this sort that have been put on the market justify the belief that some equally good method of isolating a less toxic form of cocain can be worked out by the Committee on Revision. It is hoped that, in naming this substance, a short synonym will be provided, in order to facilitate its competition with the proprietary substances already on the market.

6. An extract of ovarian tissue and of the corpus luteum. Of all the substances submitted to vote, this was the only one that failed to secure more than a bare majority. There were 99 voting yes, 67 voting no, and 28 not voting. If the Pharmacopeia is to include only those drugs that have the unequivocal indorsement of the profession, we are not justified, from the vote, in recommending the inclusion of an ovarian extract into the Pharmacopeia. It is probable that in the next five or ten years our knowledge of the manufacture and physiologic action of these organic extracts may be so much improved as to justify their admission into the Pharmacopeia, but for the present we ought to assume a conservative standpoint.

7. A counter-irritant preparation similar to ammonium ichthyol-sulphonate. The vote stood, 166 yes, 19 no, and not voting 8. There seems to be no reason why this substance should not be admitted to the Pharmacopeia, as its use in gynecology, as well as in other conditions, has been sufficiently demonstrated. Owing to the copyright laws in this country, it would not be advisable to introduce the substance into the Pharmacopeia under its ordinary name of ichthyol. The chemical name, on the other hand, is too cumbersome for the practitioner's use. We trust that some simple synonym, of not over three syllables, will be adopted.

8. A simplified name for hexamethylenamin. One hundred and eighty-one favored a simplification, nine opposed it, and six did not vote on this question. The nomenclature of substances in the Pharmacopeia is of considerable importance. It should serve two purposes: one, to indicate the correct chemical composition of the preparation, as nearly as possible; the other, to give a short, easily remembered name, for everyday use, by the practitioner. These abbreviations of chemical terms should not, as in the case of hexamethylene tetramine,

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consist merely of the elimination of two syllables ("tetra"), but the name should be cut down to such a simple form as "hexamin," even if chemically, such an appellation means little or nothing. If the U. S. Pharmacopeia is to compete with proprietary medicines, its terminology must be simplified for use by the busy general practitioner.

Ten substances in the Pharmacopeia, primarily used by gynecologists, were placed on the postal card ballot, with the view of determining whether they should be retained in the next edition of that book. The vote on these ten products was as follows:

1. Hedeoma.—The vote was 179 in favor of exclusion, 17 of retention.

2. Oleum hedeomæ.—The vote was 179 to exclude it and 17 to retain.

3. Vinum ergotæ.—The vote was 173 to exclude it and 23 to retain it.

4. Zea.—The vote was 171 to exclude it, 25 to retain it.

5. Gossypii cortex.—The vote was 154 to exclude it, 42 to retain it.

6. Glyceritum hydrastis.—The vote was 137 to exclude it, 59 to retain it.

7. Viburnum opulus.—The vote was 128 to exclude it, 68 to retain it.

8. Uva ursi.—The vote was 118 to exclude it, 78 to retain it.

9. Cerii oxalas.—The vote was 79 to exclude it, 117 to retain it.

10. Viburnum prunifolium.—The vote was 71 to exclude it, 125 to retain it.

There can be no question that physicians, as a whole, do not use the first five of these preparations enough to justify their retention in the Pharmacopeia, and likewise no question but that cerium oxalate, and viburnum prunifolium apparently give results in the hands of many physicians, so that they should be retained. What disposition should be made of the remaining three preparations (glyceritum hydrastis, uva ursi, and viburnum opulus), may be left to the discretion of the Committee on Revision.

FRED J. TAUSSIG, St. Louis, Chairman.
HENRY T. BYFORD, Chicago.
GUY L. HUNNER, Baltimore.

The following five papers were read and discussed as a Symposium on Eclampsia:

Drs. E. P. Davis and Collin Foulkrod, Philadelphia: "The Etiology of Eclampsia"; read by Dr. Foulkrod.

Drs. Edwin B. Cragin and Edward T. Hull, New York: "Treatment of Eclampsia, Including a Comparison of the Dangers of Chloroform and Ether in this Condition"; read by Dr. Hull.

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Dr. Henry D. Fry, Washington: "Vaginal Cesarean Section in Eclampsia."

Dr. Reuben Peterson, Ann Arbor, Mich.: "Indications for and Technic of Rapid Emptying of the Uterus in the Toxemias of Pregnancy."

Dr. Joseph B. De Lee, Chicago: "The Surgical Treatment of Eclampsia"; read by the Secretary, Dr. C. Jeff Miller.

These five papers were discussed by Drs. Schwartz, Zinke, Carstens, Blondhe, Burns, Rosenthal, Ritter, Foulkrod, Hull, Fry and Peterson.

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THE SURGICAL CONSIDERATION OF CONGENITAL AND DEVELOPMENTAL DEFECTS LEADING TO OBSTINATE CONSTIPATION

JOHN G. CLARK, M.D.
PHILADELPHIA

To arrive properly at a basis for the study of constipation and tympanitis, with their coincident autointoxication, one must start well back of the condition of disability and investigate the various embryologic, anatomic, and physiologic factors which may ultimately promote the train of pathologic symptoms.

Probably no condition is more lightly viewed by physicians in general than constipation, possibly because it is so common, and possibly, also, because in many instances it is more or less easily set aside by laxatives. Unless, therefore, this symptom becomes so exaggerated as to suggest a possible obstruction, it is usually viewed with professional equanimity. There is a growing tendency to look on the various laboratories of the human body as the generating ground, not only of physiologic, but under abnormal conditions of various pathologic products, in one instance beneficent, in the other very deleterious to health. The thyroid has already taken its place as the emanating source of various toxic principles, likewise the adrenals, the tonsils, etc. From that vast group of individuals who are designated neurasthenics have been culled certain groups which may be traced to these sources. Of late years the gastro-intestinal tract has been found to be a prolific source of neurasthenic symptoms, and such

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radical enthusiasts as Metchnikoff would have us believe that the colon, because of these noxious emanations, is a worse than useless reservoir, and following this train of thought Arbuthnott Lane advises the extirpation of this organ in chronic constipation and claims brilliant results from the operation. Between all radical negative and positive viewpoints of a theoretical nature there is usually a happy midway position; to ignore the colon as a source of trouble would be heresy, for it is self-evident that fecal stasis is a source of serious autointoxication. On the other hand, as we better understand this question, the total excisions of the colon would appear too radical, for Cannon's work indicates beyond question that the large intestine has a very important function in the absorption of residual food products passed on from the small intestine. It is therefore not a temporary reservoir but a very important food receptacle from which much nutrition is abstracted.

COMPARATIVE ANATOMY

There is no organ in the body with such diversity of morphology to suit variations in function in different species of animals as the intestinal tract. The stomach actively participates in the mixing and digestion of certain portions of foods; the small intestine, beginning with the duodenum, further elaborates the process, and from that point on not only digestion but active absorption is taking place. The physical life of the animal, bird or reptile, and the character of food which it ingests, appear to determine the morphology of the small and large intestine. Thus, as stated by Huntington, in such creatures as birds which make long flights, requiring not only sustained effort but incredible repetitions of dynamic explosions, the food must be rapidly absorbed, and there is no place for residual food from which slow abstraction of nutrition occurs. For instance, the canvasback duck has relatively a very long small intestine and a very short colon, almost of a

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cloacal type. On the contrary, the ostrich, which is slower of movement and feeds on a more bulky food, has a very long colon. The wide variation in animals is noted in such birds of prey as, for instance, the eagle; the length of the colon as compared with the small intestine is only 1 to 68 or 70, while in the cassowary, a species of ostrich, it is 1 to 6, or practically more than ten times as long. In animals which have long resting periods with only occasional demands for great rapidity and sustained effort, the colon is usually very capacious, in some species becoming an enormous reservoir.

As the result of his splendid research in the comparative physiology of the large intestine, Huntington[1] says:

While digestion of food substances will not be inaugurated in the large intestine, material already in the process of digestion and mixed with the intestinal juices of the preceding segment will be further elaborated in this portion of the canal and the nutritive products absorbed. This is especially the case in herbivora and omnivora, whose food is bulky, containing a large amount of refuse material and is hence only slowly digested. On the other hand the food of the carnivora is easily and rapidly digested and absorbed. After passing through the small intestine hardly any substances remain which are capable of digestion and absorption. Hence the large intestine of herbivora and omnivora is usually longer in proportion to the small intestine than it is in carnivorous animals. In the former this segment of the canal functions as an accessory digestive apparatus and hence often develop accessory structural modifications, such as a large cecum and spiral colon, while in the latter it acts almost solely as a canal for the evacuation of the indigestible remnants. Again, the large intestine is better developed in the higher animals, in mammalia and to a lesser degree in birds, in whom the functional demands for nutrition are active and require that a relatively large amount of food should pass through the digestive tract in a given time.

Man occupies a midway position in colonic development. The human race is omnivorous, taking all classes of food. A good absorbing surface as represented by the 17 to 18 feet of small intestine is necessary, and

1. Anatomy of Peritoneum and Abdomen, p. 198.

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at the same time a capacious colon for the retention of residual food products is likewise essential.

From this brief review of the comparative anatomy of the large bowel it is evident that in either the lower or higher animals it is not a useless, although it may be a dispensable, organ.

PHYSIOLOGY OF THE LARGE AND SMALL INTESTINE

The general principle of alimentary digestion may be defined as consisting of three phases; first, mixture of food with the digestive juices; second, the exposure of food to the absorbing mucous membrane, and, third, the propulsion of the food through the alimentary canal. The first takes place in the stomach and duodenum; the second in the small and a part of the large intestine. The rate of propulsion and fluid state of the food largely determine the amount of absorption. Food in transit from the stomach to the anus usually requires 24 to 36 hours, only 6 to 8 of which are occupied by the small, and the remainder by the large intestine.

As a broad proposition, therefore, one may say that the mechanical causes of constipation exist in the large and not in the small intestine. In the small bowel the food is fluid, and therefore is easily propelled along this 18 feet of flexible tubing. When, however, it reaches the large intestine in a mushy or semi-fluid state, slower inspissation takes place through the assimilation of the last remains of the nutritious portion of the food. This process must necessarily be slower, for the minimum part of the nutriment with a maximum of residue is emptied from the ileum into the cecum.

Cannon has shown in his splendid series of investigations on the physiology of digestion that the small intestine is much more actively engaged in the segregation or segmentation of food than in its mere propulsion from one end to the other. He has shown that there are two types of motility, one given over to the segmentation of food in short blocks in the small intestine, thus giving sufficient time for thorough diges-

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tion as well as absorption. During this process the mucous membrane, with its large absorbing valvulæ conniventes, is thrust into the food mass, thus exposing its maximum surface to absorption. The second movement is peristaltic, slowly carrying the food from one block to another downward toward the cecum.

From this brief reference to intestinal digestion it is evident that the small bowel plays very little if any part in mechanical constipation. That the diminution or absence of certain intestinal juices in the food may lead to constipation of a more or less functional character is unquestioned, but this does not as a rule account for the progressive constipation, starting in infancy or adolescence and terminating in symptoms closely related to or actually terminating in partial obstruction. It is to this class of cases that we are giving our attention, and it is this type which is largely ascribable to mechanical faults of congenital and developmental character.

EMBRYOLOGIC CONSIDERATIONS

To understand properly the progressive constipation of adults we must recur to the development of the intestinal tract. We cannot study this complicated mechanical process without arriving at the conclusion that here lies the chief cause of the defects or, as very clearly summarized by my associate, Dr. Floyd Keene, "The potential factors are present in early life and later become active as the result of habit, physiologic sluggishness or mechanical defects, especially developing in women from defective child-bearing process."

The gastrointestinal canal consists * primarily of a straight tube closely attached to the primitive posterior abdominal wall. Very early a portion of the upper segment shows a bulging posteriorly and a concavity anteriorly, corresponding to the greater and lesser curvatures, respectively, of the stomach. As the result of the

* Summarized from Piersol's "Anatomy" and Quain's "Embryology."

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increasing volume of the liver and increased length of the stomach segment there is a rotation to the right, so that what was originally the left side has become the anterior surface and the right side the posterior surface of the fully developed stomach. At first there is no line of demarcation between the stomach and duodenum. According to Tandler there is a great increase in the epithelium of the duodenum during the second month, so that the lumen may be greatly narrowed or even completely obliterated. This probably explains some cases of congenital stenosis. During the third month the lumen is restored by an increase in the diameter of the gut.

Early in fetal life the size of the liver is out of all proportion to that of the abdominal cavity. Consequently the rapidly increasing length of the intestine demands more room for its development. In order to find space it passes out of the abdominal cavity through the wide open umbilicus, where it continues to remain for some time. As the result of this migration an anteroposterior U loop is formed, consisting of a proximal descending and a distal ascending limb. During this process the mesentery has naturally become lengthened, and even at an early age shows the blood vessels found in adult life. The superior mesenteric artery courses between the limbs of the U loop; the inferior mesenteric supplies the posterior and lower segments.

As the limbs of the extra-abdominal loops increase in length they approach one another, and later an axial rotation of the loops takes place so that the lower limb passes over the upper. It is from this lower or distal limb that the colon develops; hence, this explains why the upper portion of the small intestine lies beneath the superior mesenteric artery. While both limbs increase in length, this takes place far more rapidly in that portion which is to become the small intestine, viz., the original upper limb. Mall has demonstrated that, while the intestine lies extra-abdominally, the small gut arranges itself into six primary coils which in their further growth

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become more complex but nevertheless can be definitely outlined in the adult.

As the result of the axial rotation referred to, the small intestine assumes a position below and to the left of the large intestine, which is now inverted U shape, and extends antero-posterior to the midline of the posterior abdominal wall. Later there is a rapid increase in the size of the abdominal cavity which permits the intestines to reenter. According to Mall the upper portion of the small intestine first assumes its position in the left hypochondriac region, to be followed by the remainder of the small intestine and colon, the cecum returning last. The coils which were primarily arranged vertically now assume a transverse position.

In early fetal life the cecum develops as a small bud at the beginning of the ascending limb. The appendix at first comes from its tip, like the handle of a funnel, but as the result of unequal growth of the anterior and right walls the appendix is thrown posteriorly and to the left. On reentering the abdomen the colon retains its inverted U shape, but the upper limb of the U is pushed transversely by the underlying small intestines below and the liver and stomach above, the cecum lying beneath the liver. The colon continues to grow after birth, and with this growth there is a migration of the cecum downward into the right iliac fossa, with the formation of the ascending colon. This does not take place completely until some time after birth. At birth the sigmoid forms a large portion of the colon (one-half, according to Piersol) and is an intra-abdominal organ, and it is not until the third year of life that the adult proportions exist.

As the result of peritoneal fusion the ascending and descending colons are deprived of a distinct mesentery.

GENESIS OF ENTEROPTOSIS AND CHRONIC CONSTIPATION

As the result of Dr. Keene's finding in autopsies on babies ample evidence in favor of the congenital origin

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of enteroptosis is discovered. Theoretically the sequence of events is as follows: During youth and early adult life the intra-abdominal pressure is perfectly maintained by the tonicity of the abdominal musculature. A potential or latent enteroptosis may be present, but is not symptomatic because the redundant colon is held in such a position that the lumen is not interfered with. That such a redundancy exists has been shown in several autopsies on babies where, for example, in several instances the transverse colon was plicated on itself in order to find sufficient room for its development. It might be thought that the increase in size of the abdominal cavity would permit of an unfolding and straightening of the intestines, but this is not probable because the increase in size is not sufficient, since these colons are sometimes enormous when compared with the general development of other organs, and, secondly, the colon continues to increase in length after birth. The theory that the transverse colon will be straightened in the further developmental cycle by the descensus of the cecum and formation of ascending colon is not tenable, because in several of our observations the redundant transverse colon was coincident with complete descensus of cecum.

Given such a case, an actual symptomatic enteroptosis replaces the potential or latent enteroptosis when one or more of the following factors come into play: As the result of childbirth or wasting disease the tonicity of the abdominal musculature is replaced by a hypotonicity, with consequent diminution of the intra-abdominal pressure, permitting a sagging of the intestine with the formation of kinks at the junction of the movable and fixed portions. While faulty posture, as pointed out by Goldthwaite, may have the same effect, in addition to the removal of the normal buttresses of the abdominal organs, as cited by Martin, we are inclined to the view that posture and the characteristic body form of some of these individuals may be the direct result of faulty

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nutrition in infancy and childhood, and are therefore a resultant and not a cause of the enteroptosis. Congenital and acquired adhesions and kinking must also play a part. Fecal stasis should be looked on, not as the cause of these conditions, but as the result of them. No doubt the presence of a large fecal mass more or less constantly exercising its weight may exaggerate the disability.

Dr. Keene's autopsies have verified Treves' observations that the sigmoid at, and even several months after birth, forms a large part of the colon.

From this reference to the embryology with the autopsy findings in Dr. Keene's series of infants it is evident that from the very beginning abnormalities of formation and position of the large intestine may exist with coincident colonic sluggishness which early leads to constipation. It is interesting to note in this connection that the majority of exaggerated enteroptoses, and particularly those of colonic type, that the history of constipation is traced back to childhood days. In the light of these embryologic deviations, which are so frequently noted, we are not surprised to find constipation such a prevalent complaint in infancy and childhood.

Thus Coolidge[2] says:

> Relatively more patients are brought to us for treatment of constipation than for any other one disease. Babies of all ages and conditions whether breast-fed of bottle-fed seem to suffer equally from this condition. In a large per cent. of the cases we find the cause of constipation in the infant due to improper food which is taken by the baby itself or else by the mother, if the child is breast-fed. A few cases have a decided weakness of the rectal muscles, making it impossible for the baby to expel the feces even though the food is well digested and suited to the individual child. Constipation due to defective portal circulation and lack of bile secretion is one of the most difficult forms to treat in young infants; frequently this cannot be entirely overcome until the child is old enough to take solid food and systematic exercises.

Constipation, therefore, in infancy is a besetting symptom; its explanation, while largely theoretical, harks

2. Bull. Lying-in Hospital, New York.

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back to anatomical as well as functional defects. One may be relieved with careful medical and hygienic regulations; the other is not so easily overcome, as this persistent symptom in adults demonstrates.

Until the advent of the *x*-ray as a diagnostic agent in enteroptosis clinicians had made little progress over the original discovery of Glénard, for there was no accurate method of determining the organ or group of organs chiefly participating in the visceral descensus. This failure to recognize these conditions probably accounts for the widespread adoption a few years ago of nephrorrhaphy, a procedure which captivated many gynecologists and general surgeons. Those careful observers who followed the after course of their cases soon realized that this operation was far from a cure-all, and, indeed, as frequently performed on the more palpable indications of undue mobility, ended in lamentable symptomatic failure. We soon realized that many of these patients were persistent neurasthenics, and for a cause, but the kidney was but one part of that cause and usually a very small part.

It is a classical fact that the neurasthenic individual is of all other cases the worst for surgical intervention unless there is a well defined indication for its adoption. The participation of a movable kidney in the presence of other prolapsed viscera is therefore of small account in the general abdominal symptoms noted by Glénard. Failure to cure these cases has caused our attention to be centered in a more analytical manner on symptoms emanating from other organs of this group. The use of the *x*-ray has done much in segregating the stomach in one class of cases as the dominant source of symptoms and the colon in another class, and we now believe far the greater of the two. Also the *x*-ray has helped in differentiating between cases of redundant sigmoid and the transverse colon of exaggerated length and displaced and angulated flexures.

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While great assistance has come from the use of the *x*-ray in this anatomic isolation of gastrointestinal segments, we have also learned that it is not the court of last resort in defining treatment. Clinical data and close observation of the symptomatology alone can do this. Exaggerated ptoses are not necessarily productive of profound symptoms. Time and time again we have observed cases with very deeply dependent transverse colons or with great redundancy of the sigmoid and moderately good or even perfect function maintained. Manifestly it would be a most injudicious procedure to disturb by a surgical operation such an intestine; on the other hand, a well defined history of increasing constipation extending back to babyhood, and at times approaching full obstruction, which has been uninfluenced by medical skill, should have surgical attention. I approach the discussion of the surgical treatment of these cases with trepidation, for I realize from my experience that unless most cautiously employed it will be hazardous, not so hazardous to the life of the patient as to the repute of surgery. On the other hand, experience also teaches that operative treatment holds happy possibilities if proper care is observed in the selection of cases.

I therefore preface my suggestions as to surgical intervention with this caution, for these patients are now in neutral ground between medicine and surgery. One class, much the larger, should remain within the medical domain, while the other must be transferred to the surgeon. An indiscriminate tendency to operation, however, will cast unjustifiable criticism on measures which may be most beneficial if properly selected. This is, I believe, the frontier line of surgery and should be developed by careful methods and by men of wide experience. It is not the field for a novice.

From our clinical study of these cases we now find greater possibilities of differentiating between those with dominant gastric symptoms or with major colonic symptoms. In many cases of exaggerated coloptosis the gas-

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tric function is normal because the stomach is little interfered with. On the other hand, in marked types of gastroptosis there may be no coloptosis.

This address has as its theme exaggerated constipation due to abnormalities of the colon, and I therefore pass over the question of gastroptosis.

ANATOMY OF THE COLON

One cannot take up this subject without harking back to Treves' classical lectures on "The Anatomy of the Intestinal Canal and Peritoneum."[3] This classical research not only lays down the groundwork of our present knowledge of the intestinal canal but forecasts in a few trenchant paragraphs the pathologic aspect of embryologic and developmental deviations.

In his consideration of the ascending, transverse, descending and sigmoidal portions of the colon, Treves centers many interesting observations on the individual portions. The mutual relations existing between the segments in the adult do not exist at birth, but only assume their morphologic associations some time after extrauterine life. Thus the hepatic flexure does not exist at birth and the cecum completes its descensus after this time. The colon, therefore, assumes in many instances a more or less oblique direction from the right iliac to the left splenic area without a hepatic flexure. Should the hepatic flexure lapse through faulty development, at once a weakened area in the colon develops, which may lead to ptosis of this portion of the gut. Such deviation, however, as we have frequently observed clinically does not necessarily lead to disabilities, for the colonic function under these conditions may be maintained unimpeded. The cecum may remain without descensus high in the right hypochondrium or even occupy a position under the liver. In other instances it may undergo exaggerated descensus, dropping well over the brim of the pelvis or even into Douglas' cul-de-sac. Unquestionably some

3. Brit. Med. Jour., 1880, 1.

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exaggerated cases of the latter type not only give rise to chronic appendicitis but maintain cecal and ileac peristalsis with considerable pain, even after this organ is removed. A very flabby cecum falling into the pelvis may cause considerable disturbance in the discharge of alimentation from the ileum into the cecum. While these cases may be rare, we should not lose sight of this possibility, and in cases of exaggerated ceca they should be sutured back into the proper position. This procedure is both simple and safe and should not give untoward results. In a few cases in our own experience a happy relief has been afforded by this measure.

No portion of the colon is subjected to greater variations than the transverse; it is, indeed, so variable that we may even doubt whether there is a normal situation and length. Treves found that the transverse colon averaged about 20 inches in length, the shortest noted being 12 inches, the longest 33.

On drawing a thread transversely across the abdomen from the highest point of one iliac crest to the other he ascertained that in the majority of instances the inverted colic arch was above this line, while a fourth were below it.

One cannot note this observation without being irresistibly forced to the conclusion that this smaller percentage of cases cannot functionate properly, and that from this class a considerable number of defectives must be culled as typified by the neurasthenic of constipated habit. To draw the conclusion that Treves' thread defines a health zone above or a neurasthenic boundary below would be indeed a far cry, but we may not go false in our reasoning if we assume that some at least of these exaggerated cases must give us the slim-chested, long-waisted, peripatetic neurasthenic, drifting from one office to another, and finally exhausting all the modern pathies in the search for health. Such dependent colons must inevitably be sluggish in action, for they frequently have exaggerated hepatic and splenic kinks, which retard

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peristalsis, and thus a reservoir for deleterious fermentative products is established. When we assume that perfect alimentation is synonymous with ideal development we must logically follow the corollary: Imperfect alimentation will retard or lead to imperfect growth. If, therefore, we accept the theory which appears to be well based on embryological and developmental observations, that many cases of exaggerated constipation are of embryologic or early extrauterine origin, we are led to the inference that the so-called enteroptotic figure or faulty posture in these individuals arises from this defect rather than causes it. If this be true these patients can at best be only temporarily helped and not cured by orthopedic or gymnastic treatment. However, this is a digressive thought rather than a criticism, for no form of treatment should be left uninvestigated that may lead to the relief of these patients, for they are indeed miserable sufferers and form the list of undesirables in all medical offices.

Treves believes that these deviations in the colic arch are due to embryologic malformation and effects of persistent distention, for he found in these subjects that the dependent loop was overloaded and distended with fecal matter, and he anticipates our viewpoint when he says, "Such individuals have probably been the subjects of chronic constipation and have more or less constantly presented a distended state of the colon."

How easy, too, as we have so often observed clinically, for these same individuals to become martyrs to an otherwise beneficent surgical operation through adhesions binding in fixed position the previously very sluggish bowel. Thus under such operative sequelæ a chronic constipation may become an obstruction of varying severity.

The descending colon is subject to few variations, and these are of small pathologic significance. On the other hand, the sigmoid flexure is given to extensive variations. The infant with the large, redundant and dilated sig-

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moid, suffering with Hirschsprung's disease, in my opinion, is only an exaggerated predecessor of the obstinately constipated adult with a lesser degree of sigmoid redundancy and dilatation. The sigmoid flexure in the adult varies in length from 7 to 27 inches, the average being about 7½ inches. There can scarcely be said to be a normal length, the variations in the sigmoid being so great. As with the transverse colon, one cannot apply the tapeline or measuring stick to this organ to define what is functionally normal. We must consider these cases from the symptomatic standpoint in order to determine the degree of functional abnormality in relation to anatomic defects. Just as the tapeline will not give us a measure of pathologic function, so does the *x*-ray also fail. This entire question must not be considered from these viewpoints, for they will lead to gross errors of judgment, just as such serious errors have arisen in thus viewing movable kidneys.

Actual and well-defined functional disturbances directly centering in these areas must determine the necessity for treatment. A kidney with a wide excursus, which has no renal crisis or fixed symptoms incident to ureteral obstruction, is not an organ for surgical intervention. On the other hand, another kidney with a much smaller excursus and yet the seat of renal or ureteral colic should be relieved by operation.

So one sigmoid of exaggerated length may yet functionate properly, and the surgeon who should drop his tapeline on it and because it measured more than 17 inches, determine to suspend or excise, will at once cross the pons asinorum.

The gist of the whole matter is that neither the anatomic standard nor the *x*-ray picture is to serve as a standard for an operation. Symptoms, indeed, exaggerated symptoms must be the guide. Further, one cannot approach the surgical treatment of these cases with such optimism as experience justifies in acute surgical lesions, for if we accept the view that many of these

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cases are of congenital origin we have at best a defective machine to deal with, in which the dynamic power is seriously or hopelessly impaired and in which there will not be a healthful rebound such as gives such gratifying results in acute surgical cases. I believe we are establishing well-defined surgical principles in some of these cases, and that from this hitherto hopeless medical flotsam and jetsam brilliant cases of surgical cure may be culled, and, further, that while a complete cure may not be effected, at least a sufficient relief may result from well-selected surgical procedures as to cause us to give these poor individuals closer study in the hope that we may afford them even partial relief.

SYMPTOMATOLOGY

From our observations in this class of patients we have discovered that a very precise history is necessary. Too often the bald statement is found in a poorly elucidated history that the patient "suffers from constipation." Such brevity is worse than valueless, for this symptom should be traced with full elaboration back to its fundamental source. In this way only may we differentiate between a functional and an anatomic constipation. Even after a history traces the symptoms back to early infancy one should not jump to the conclusion that a serious developmental defect exists, for the therapeutic test must be applied. An individual in whom the regulation of diet or the administration of some simple laxative, even if necessary of constant repetition, cannot be said to be seriously affected. Such cases have no place in the surgical domain. On the contrary, when an individual must resort to powerful purgatives and drastic enemata, and especially if there is an associated tympanitis with painful peristalsis, he must be considered as suffering from some serious anatomic or pathologic defect. My point will be best illustrated by type histories, which point with accuracy not only to these

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defects, but also to the segment of the colon most involved.

CASE REPORTS

EXCESSIVE REDUNDANCY OF SIGMOID FLEXURE

CASE 1.—*History.*—Single girl, aged 19. From earliest infancy the patient has been obstinately constipated. Formerly moderately strong laxatives were necessary to effect an evacuation. Of late years, however, these measures have failed and she has been compelled to use the most drastic purgatives in increasing and repeated dose. Several months ago pain began to develop low down in the left lower quadrant of the abdomen. This pain is increased by exercise and relieved by a complete evacuation of the bowels, and by the recumbent posture. This pain is always increased during the premenstrual epoch. Three or four years ago she suffered for some time with a severe aching sensation in the right iliac region, but this disappeared and has only recently recurred. She has gastric indigestion with epigastric distension and belching coming on some time after eating. There is also general abdominal distension which is relieved by defecation. For several years she has been troubled greatly with frequent desire to void urine, but there is no dysuria. There is no blood or mucus in the evacuation. For some time there has been more or less persistent nausea which increases to actual emesis during the first menstrual day. Menses appeared first at 12 years of age. The flow occurs from 28 to 40 days; lasts five days and is painful. She has never been strong but has had no acute illness. She is of small, slender, undeveloped stature and weighs 110 pounds. She sleeps well but complains almost constantly of occipital headache. The ordinary domestic duties are wearying to her; and she is of a nervous temperament. For the past three years she has been under a physician's care. Chief attention has been given to her dysmenorrhea. This pain comes on just before the onset of the flow, and is an intense bearing down sensation.

Examination.—The pelvic examination revealed no palpable abnormality; the uterus being in normal position, and the ovaries of average size and in normal situation. An *x*-ray examination revealed a very redundant sigmoid flexure with approximately normal position of the stomach and transverse colon. So much stress had been laid on the pelvic symptoms that only the failure of all forms of treatment had convinced the patient and her parents that this was not the seat of her disabilities. The possibilities of relief from excision of the

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sigmoid were discussed with the parents and they readily assented to any plan that offered the hope of cure, for the increasing invalidism of the patient had become so evident as to cause them great alarm for the future.

Operation.—Median hypogastric incision. Moderate ptosis of transverse colon was found, insufficient to warrant any operative intervention. Hepatic and splenic flexures in normal situations. Appendix normal, but as the pain had formerly and of late been so marked in this region, it was removed. The sigmoid was then pulled out of the incision and was found to measure about 24 inches in length. It could easily be pulled up to the xiphoid cartilage, and when resting in the pelvis formed an irregular tube, lying in Douglas' cul de sac and coiled on the bladder. Eighteen inches were removed, followed by an end to end anastmosis. Even with the excess removed the sigmoid still presented a normal appearance of average length. In this case the characteristic congenital adhesions between the meso-sigmoid and lateral abdominal wall were encountered. These caused considerable constriction and limitation of distention. Cervix dilated and Wylie drain inserted.

Subsequent History.—Second day: Patient has made a good recovery; some distension but good peristalsis.

Third day: Wylie drain expelled.

Seventh day: Copious evacuation of bowels following a dose of castor oil.

Subsequent week: Bowels moved with difficulty.

Second week: Regulation of diet, with 15 minims of cascara given at night very satisfactorily corrected constipation; in other ways marked improvement; no pain in left side.

Note on discharge, twenty-fourth day: Wound well healed. Bowels nicely regulated with 15 minims of cascara. Bismuth injection was given preparatory to a final *x*-ray. Patient's nurse noted the great ease of injection as compared with the attempt previous to operation. The *x*-ray picture revealed a well-situated and capacious sigmoid.

This patient continued to do well so far as the intestinal function is concerned, but the time since operation has been too short to test the ultimate result. Measured by other cases, however, we anticipate a final improvement of very decided character.

REDUNDANT SIGMOID WITH GREAT PTOSIS OF TRANSVERSE COLON

CASE 2.—*History.*—Single woman, aged 27, of spare build, with no adipose tissue, bust being flat and undeveloped. Patient has never had any serious illness. Up to puberty

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had the average health of a young girl but was always greatly troubled from infancy with obstinate constipation. Does not remember the time when bowels were evacuated without a cathartic. For one year she was under constant treatment for anemia, taking large doses of iron. Her maximum weight is only 100 pounds. Her complexion is smooth but sallow. One year ago was seized with sudden severe pain in the right ileac region, although the pain was more or less general and of a paroxysmal, colicky nature, and was associated with abdominal distention, nausea and vomiting. This pain lasted several hours but the tenderness persisted at McBurney's point. For several years she had noted at times pain in the region of the ascending colon, and for some time there has been tenderness to pressure over the cecum and ascending colon. Deep pressure in ileac region causes pain to move upward to the hepatic area. Since the first attack she has had frequent colicky seizures which are always relieved by a bowel movement. She has always been embarrassed by loud borborygmus, and there is occasionally very distressing distention. She very definitely outlined the gurgling sensation along the course of the colon. No symptoms referable to gall bladder. Menstrual history normal. No backache; no renal or vesical symptoms.

Examination.—Pelvic examination negative. The *x*-ray reveals a greatly ptosed colon. The pelvic area shows a broad shadow making the differentiation of the transverse colon from the sigmoid impossible.

Operation.—Median hypogastric incision. Pelvic organs normal. Sigmoid flexure markedly redundant and dilated. Transverse colon markedly redundant; apex of colic arch in pelvis. Hepatic and splenic flexures in normal situation but greatly dragged on by colic ptosis. Cecum dilated. Appendix small, no adhesions, no sign of chronic inflammation. Twelve inches of sigmoid flexure resected, appendix removed, transverse colon suspended by Coffey operation.

Subsequent History.—Third day: Excellent recovery; condition satisfactory.

Seventh day: Wound healed. Bowels moved freely and easily.

Nineteenth day: Patient discharged to-day. Since the bowels were moved following the operation there has been a marked change in the ease of evacuation. While previously even large doses of cathartic failed, or only partially relieved the obstinate constipation (obstruction), now there is a spontaneous movement as a rule, and at most only 15 drops of

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cascara are required to give two movements daily. There is no abdominal distention and the patient is enthusiastic over her improvement.

Four months have now elapsed since the operation and the return to health has been most satisfactory.

CONGENITAL ADHESIONS CAUSING PARTIAL OBSTRUCTION OF SIGMOID

CASE 3.—*History.*—Married woman, aged 24. Menstrual history normal. So far back as patient remembers she has had obstinate constipation. By persistent treatment she has had temporary intervals of comparative comfort. For the last eight years she has had a dull aching sensation in the left ileac region, and for the last six years she has had recurring attacks of sharp colicky pain in the left side, greatly increased by inattention to bowels and relieved to some extent by defecation. She volunteers the information that gas seems to meet some obstruction at the "sore spot." Posture does not change the character of the pain, but there is some abatement on lying down. For some time she has been under skilled medical treatment without relief. Enemata have been given, and during this time there has been considerable vesical irritability with frequent micturition. Recently there has been more or less mucus in the feces. She is subject to occasional attacks of sick headache. No indigestion; in fact, has an unusually good appetite. There is no excessive peristalsis. "The pain seems to be caused by gas rolling up against something."

Examination.—*X*-ray examination reveals a considerable massing of bismuth in the region of the sigmoid. No evidence of ptosis of transverse colon.

Operation.—Median hypogastric incision. On first attempt to ascertain cause of disability nothing of pathologic significance was noted, but after a closer inspection it was found that the sigmoid, instead of starting directly from the termination of the descending colon, continued along the pelvic brim and was firmly bound down by a congenital band of peritoneum which pulled the pelvic bend of the sigmoid close in against the pelvic wall. Above this point the intestine was greatly dilated; below, contracted.

The point of constriction corresponded to the area of pain. These peritoneal bands were divided by careful dissection, and on their release the sigmoid assumed its normal position. As there was danger of recurrence of the adhesions, several Pagenstecker linen stitches were carried from the base of the sigmoidal epiploic appendages to the ventral wall of the left

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groin, thus retaining the gut in its normal topographic position. A careful survey of the entire abdomen failed to reveal any other abnormality. The pelvic organs presented no trace of previous inflammation, thus excluding this focus as the cause of the adhesions.

Subsequent History.—The convalescence was uneventful, and the patient was uneventful, and the patient was discharged 21 days after the operation. All pain and sensation of obstruction promptly disappeared and the bowel resumed its normal function. Defecation was usually spontaneous. Four months have intervened since the operation without the slightest recurrence of her old symptoms.

EXCESSIVE PTOSIS OF THE TRANSVERSE COLON

CASE 4.—The following history illustrates the effect of potential congenital factors becoming active after childbirth:

History.—Married woman, aged 34. Has given birth to three children, the youngest being 6 years of age. Until four years prior to examination she was largely free from abdominal symptoms. At this time she was in a runaway accident and was thrown violently with another woman from the carriage, her companion falling heavily on her abdomen. She was unconscious for a time, and following this had fever ranging from 99 to 100 F. for several days. On getting up she was conscious of a constant feeling of pressure to the right of the umbilicus, extending from the costal margin downward to the right iliac fossa. She noticed, also, some time after eating, a constant churning sensation along the course of the ascending colon (suggestive of Cannon's description of movement in this area). There is also considerable distention in this area from gas. Appendicitis had been suspected. One year previously vesical tenesmus with frequent micturition became a distressing symptom, and was treated for some time without relief as cystitis, although the urine was always negative. She described a sensation as though something were rubbing against the bladder. All of the symptoms were markedly increased when standing. She particularly called attention to the fact that for the last ten years, since the birth of her first child, she had been greatly constipated, and this had become more exaggerated since the accident. She had been almost completely invalided for the last year.

Examination.—*X*-ray revealed a mass of bismuth entirely within the pelvis. With this picture as a guide in conjunction with the above history, a diagnosis of exaggerated ptosis of the transverse colon was made.

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Operation.—Median hypogastric incision, revealing a very serious dislocation of the colon, even worse than indicated by the *x*-ray. The cecum and what should have been the ascending colon possessed a long mesentery. There was complete absence of any sign of an hepatic flexure. The cecum occupied the pelvis and six inches above it there was sharp angulation at the point where the colon passed obliquely upward to the splenic flexure. The colon proximal to the kink was greatly dilated as was also the appendix. The latter organ was as large as the little finger and distended with gas, without any point of constriction. Its walls were attenuated through over-stretching. Beyond the stricture the bowel was normal. The patient was particularly anxious that no unusual risk be taken, and although excision of a portion of the bowel seemed to be indicated we adopted the less hazardous operation of restoring the bowel as nearly as possible to its normal fixation points.

To accomplish this a second incision was made in the hepatic area. A point on the colon was selected for conversion into a hepatic flexure. Several peritoneal sutures were so placed as to snugly fix the intestine well back under the costal border of the liver. A careful examination of the upper zone of the abdomen revealed no further abnormality. The position of the stomach was essentially normal. After restoring the hepatic flexure a line of omental fixation was established across the abdomen, thus pulling the transverse colon well up out of the abdomen. The dilated appendix was removed. The kidneys were normal.

Subsequent History.—The subsequent recovery of the patient was uneventful although slow because of the severe asthenia. The bowels are still sluggish but are moved without difficulty. One aloes, strychnin and belladonna pill, with one drachm of sodium phosphate are sufficient laxatives.

For a time she suffered with painful peristalsis, but this subsided. The vesical symptoms disappeared within 24 hours and have not returned. She easily retains her urine for the normal length of time without discomfort. Likewise the "churning sensation" in the right side (Cannon movements), is no longer felt. Two months after leaving the hospital the patient reported from the Virginia Hot Springs that she had made splendid gains and was able to walk two miles without much fatigue and with great comfort. One week later on her return home further improvement was noted. The patient now has no abdominal discomfort.

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EXCESSIVE REDUNDANCY OF TRANSVERSE COLON

CASE 5.—In the following case there was temporary relief from ventro-colonic suspension, with recurrence of disability from the breaking away of the suspension points. Permanent relief was secured after excision of the redundant portion of the colon.

History.—(Gyn. 1259 and 1942.) Patient aged 28; para, II; no miscarriage. (Hospital Notes:) First admission May, 1904. Patient's health was good until her first child was born four years previously. For a year she did not seem to regain her strength. Bowels always markedly constipated. She complained of a constant pain in the right lower quadrant of the abdomen, described as being the sensation of the presence of a lump varying in size from a hen's egg to a teacup. This pain was aching in character. It began within a year after the birth of her child. At that time although greater on the right side it was distributed generally over the lower abdomen. While pregnant with the second child, born nineteen months prior to first admission, this pain was increased, but her suffering was not of such a degree as to compel her to give way to it. About five months previous to examination her symptoms became so severe as to cause her to become quite prostrated. The pain was constant and was attended by paroxysmal exacerbations which were more definitely located in the right groin. She began to lose weight. For the past three months opiates have been necessary for the relief of pain. She was kept in bed, given a light diet, and during her stay had little or no pain whatever. On account of the possibility of specific infection (she developed a skin eruption with itching and alopecia just before admission) she was placed on protiodid of mercury and was kept in bed on light diet. With this plan of treatment she seemed to improve so that no further thought was given to operation.

Second Hospital Admission.—June 10, 1904. (Hospital Notes:) The patient was in the hospital four weeks prior to above date, having been sent with a diagnosis of recurrent appendicitis. At varous times, as will be seen by the history, she had severe attacks of abdominal pain. She lost greatly in weight, became extremely anemic, and had the appearance of a very ill person. On her return home and the resumption of her domestic duties all of her symptoms returned with their old-time severity. Her physician at once sent her back to the hospital asking that some operative procedure be done for her relief. The case was again studied thoroughly, and

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while it was recognized that she had a gastroptosis it was not thought to be sufficient to produce the symptoms of which she complained. The appendix was not tender to pressure, the pelvic organs were normal and there was no tenderness or distention of the gall-bladder area. The skiagraph demonstrated an exaggerated ptosis of the transverse colon. Operation was then advised.

First Operation.—At the time of operation the following organs were found to be normal: Uterus, ovaries, tubes, appendix, gall-bladder and kidneys. An unusual condition of enteroptosis, however, was encountered. The lower curvature of the stomach dropped two inches below the umbilicus. The transverse colon had prolapsed until it was lying as a crumpled mass in the pelvis, and was so pendulous that her pain could easily have come from one of two causes; either the twisting of the mesentery, forming a partial congestion of the dependent portions of the colon, or, what is more likely, the junction of the ileum with the cecum was sufficiently kinked at times to make the egress of gas and fecal matter difficult, thus producing intense colicky pains from partial obstruction. The colon was pulled up and the omentum sutured to the anterior abdominal wall. Convalescence was normal.

In reply to a letter six months after the operation, the patient wrote that she was perfectly well so long as her bowels were kept well open and she did not eat foodstuffs known to habitually disagree with her or that caused fermentation. When she was indiscreet in diet or allowed her bowels to become constipated she had some griping pain in the abdomen. Occasionally, at long intervals, she had paroxysms of abdominal pain, but they were not so severe as formerly nor in the same location. Bowels tend to become constipated, constantly requiring medicines.

Third Hospital Admission.—September, 1906. (Hospital Notes:) (Gyn. 1942.) Since the last note was made patient gradually drifted back into her old condition. There were constantly recurring attacks of agonizing abdominal pains, which seemed to center more about the umbilicus than at any other point. Her condition became so bad that she was again becoming addicted to the use of morphin.

X-ray picture demonstrated that the transverse colon had again dropped into the pelvis. Her physician had been informed that it would be useless to repeat the suspension operation, and if anything were done it would be necessary to resect a portion of the transverse colon.

Second Operation.—On making the abdominal incision the skiagraphic diagnosis was verified. The transverse colon had

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broken away from its attachment and had again become a pelvic organ. The loop was so pendulous that it could easily be twisted on itself, thus producing partial obstruction of the bowels with extreme torsion of the mesenteric vessels. It was necessary to resect 18 inches of the transverse colon in order to overcome this extreme redundancy. At the completion of the operation (end to end anastomosis) the colon stretched with a gentle curvature directly from the hepatic to the splenic flexure. In addition to the anastomosis the hepatic flexure was stitched back to its normal position.

Subsequent History.—Convalescence was ideal. Her physician writes that she has not had the vaguest return of pain, has gained gradually in weight, and is able now to eat all varieties of food which previously gave her excruciating pain. In a letter dated Feb. 11, 1907, patient says, "Since the operation I have had absolutely no pain, and am able to eat anything and everything and have an excellent appetite, which did not exist for months before the operation. I have not felt so well for years as I have since I left the hospital. When I went into the hospital my weight was 105 pounds. I now weigh 113. My bowels act regularly and naturally. There has scarcely been a day since the first of November that they have not moved once, and sometimes twice, with no pain whatever. Since the first of January I have been doing my own housework and feel so much better for the exercise. Before that I was so nervous I was miserable at times. That left me as soon as I took up the home duties, and now I cannot find an ache or a pain anywhere and am hardly nervous at all. There is scarcely any gas on the stomach. Once in a while there is a little but it passes off through the bowel without any trouble." Since this last note the patient has maintained perfect health; indeed is stronger than she has been for years.

CONGENITAL PTOSIS RENDERED ACTIVE AFTER CHILDBIRTH AND INTENSIFIED AFTER ABDOMINAL OPERATION

CASE 6.—*History.*—(Gyn. 1773). Admitted April 5, 1906; seen in consultation with Dr. J. H. Musser. Present trouble began after birth of her first child. She had an adherent placenta, which was not delivered for four days. After this time she was very ill with fever for some days, and when it abated she had severe pain in both ovarian regions. The pain persisted throughout the two following pregnancies until four weeks after the birth of her last child, when both ovaries were removed by her surgeon. At the time her ovarian pain began she was troubled greatly with backache; this has re-

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mained unchanged. Following operation she had continual pain in the appendiceal region; this gradually grew worse and at times was attended with fever. Finally it became so severe that another surgeon removed her appendix, finding it not inflamed but drawn out and adherent. This was one year after her first operation. The recovery from the second operation was attended by hiccough, vomiting, high fever and pain, with swelling of the wound. Patient says it was blood poisoning. Immediately after getting out of bed she felt a pulling sensation, with pain in the right lower abdominal quadrant just below McBurney's point. This pain has been steadily growing worse and she has become more and more constipated. A history of mild constitpation dates back to early childhood. This pulling affected her right arm so that she could not raise it far from her side. Should she strain herself in an effort to use her arm, the pulling sensation would be increased; there would be severe pain followed by marked abdominal distension, necessitating absolute rest in bed with the use of cathartics and turpentine stupes for from one to six days. For the year previous to operation the right leg had been drawn up and she had pain from hip to knee, and could not straighten the knee. She tried the rest cure without relief, and finally consulted Dr. Musser. *X*-rays revealed a much-distorted colon, the transverse portion being pulled down and held closely to the cecum by adhesions.

Diagnosis.—Ptosed and adherent transverse colon.

Operation.—Release of adhesions; suspension of colon (Coffey operation). Omentum and transverse colon were adherent to anterior abdominal wall and ascending colon. Portion of omentum resected.

Subsequent History.—Since the operation patient has ceased to have abdominal pain. Bowels regular; no tympanites. She reports complete relief of abdominal symptoms; has gained twenty pounds in weight and has excellent health.

These cases have been selected as types and might indicate an ideal termination of all these cases. Such is not the case, for failure has attended several operations and only partial relief has followed others.

In addition to the cases already reported I may give this additional summary from cases the after-course of which I have been able to follow:

Suspension of sigmoid flexure, 5 cases; 3 cured, 2 unimproved.

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Suspension of transverse colon (ventro-omental fixation), 6 cases; 2 cured, 3 improved, 1 failure.

Excision of sigmoid, 3 cases; 1 cured, 2 improved.

Erasion of sigmoid and suspension of transverse colon, 1 case; cured.

Lateral anastomosis from one limb of sigmoid to the other, 2 cases; 1 cured, 1 died a year later from some unknown illness. Her physician reported marked improvement after her operation.

Excision of transverse colon, 3 cases; 1 almost entirely well, 1 improved, 1 unimproved.

Three fatalities have occurred; 1 death from peritonitis, 2 from acute gastric dilatation.

Finally, I can only reiterate the statement that these cases must be very accurately studied. The history is of such paramount importance that every detail should be followed to its end.

CONCLUSIONS

1. Developmental anomalies are at the bottom of many cases of chronic constipation.

2. Posture is frequently a result rather than a cause of this ptosis.

3. Congenital potential factors are present in many individuals which become active through accident, such as traumatism, rapid and badly-cared-for childbirth, habitual constipation, operative adhesions, etc.

4. Neurasthenia often dates from childhood or puberty; operation, therefore, in the adult may give only partial relief because of this constitutional asthenia.

5. Cases in which there is a recent acquirement of the active factor give the best surgical results.

6. Various suspension operations are valuable in properly selected cases but disappointing in the remainder. At best these fixation points may be unstable.

7. Radical excision of obstructive portions of the large bowel may give the highest percentage of operative mortality but is likely to give the best ultimate results in the survivors.

8. In no field of surgery should haste be made slower than in this. It is not a field for the novice.

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9. The most important factor in the diagnosis is a detailed clinical history pointing accurately to obstructive possibilities. A well taken skiagraph is of the greatest confirmatory value.

NOTE.—My two associates in this work, Dr. Floyd E. Keene and Dr. Nate Ginsburgh, will publish shortly papers on the embryologic and anatomic aspects of this question. I am greatly indebted to both for their assistance in this investigation.

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INFECTIONS OF THE ENDOMETRIUM

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All that is attempted in this paper is to describe the reactions of the various cells of the endometrium to infection. It is based on the study of a large number of endometriums known to be infected. From these a few have been selected to illustrate the typical cell changes. No distinction is made between the results of the various infecting organisms. No attempt is made at a classification.

Up to the present time, writers undertaking to describe the pathologic changes in the endometrium due to infection have constantly confused them with the physiologic changes that take place during the menstrual cycle. As these physiologic changes have been recognized too recently for the profession in general to be familiar with them, it is necessary to review briefly the histology of the normal endometrium before taking up the changes that are found as the result of infection.

NORMAL HISTOLOGY

The surface of the normal endometrium is covered with a single layer of low columnar epithelium. The glands are tubular and lined by the same variety of epithelium as is found on the surface. Between the glands are the oval stroma cells that make up the mass of the tissue. They are supported by a fine net-work of connective tissue and interspersed with a few round or lymphoid cells.

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Just after menstruation the glands of the endometrium are collapsed, straight and narrow; the epithelium is low, regular, in a single layer, and the nucleus takes the stain evenly and deeply. The stroma cells are regular, oval in shape and stain well. Just around the glands are a few spindle-cells. Scattered through the stroma are a few small, round cells that stain very deeply. Occasionally a group of lymphoid cells are seen. These groups can be easily recognized by the compactness and regularity of the outline of the boundary of each group. Before attempting to recognize the results of infection in the endometrium, it is absolutely essential for the observer to familiarize himself with these scattered, round cells and the groups of lymphoid cells. Individually they cannot be distinguished from the small, round cells that appear in such great numbers as a result of infection. It is a case of distinguishing between a corporal's guard and an army.

Just before menstruation the glands are found distended with mucus and very irregular in outline; but there is a certain amount of uniformity in the irregularity seen in the glands, that is, all the glands in the same portion of the endometrium have a similar appearance. A part of the irregularity is only apparent and not actual, and is due to the swelling of the epithelium lining the glands and its projection in tufts into the caliber of the glands. The stroma cells are enlarged, more rounded and take the stain less deeply. This change in the stroma-cells is more marked in the superficial portion of the endometrium. There is some, though no very great, increase in the round cells in the stroma.

In the interval there is a gradual change from the postmenstrual to the premenstrual type.

PATHOLOGIC HISTOLOGY

The changes due to infection are noted in the superficial epithelium, in the stroma and in the glands.

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Superficial Epithelium.—Under the influence of infection the superficial epithelium undergoes marked changes. The nuclei increase in size, become rounded, take less stain and present a granular appearance (Figs. 2 and 3). The cytoplasm disappears. A portion of the cells break down and disappear (Fig 3). Round cells penetrate the epithelial layer and are lost in the uterine cavity (Fig 2). A fibrinous exudate is occasionally observed, poured out over the epithelium (Fig. 1).

Stroma.—In the acute cases the first thing that strikes the observer is the extraordinary number of small, darkly staining round cells present. They cannot be distinguished individually from the same sort of cells that are present normally in the endometrium, but, instead of being scattered here and there, or collected in groups with definite outlines, they are diffused in great numbers throughout large areas (Figs. 1, 2, 3, 4, 5).

The first change that is noted in the stroma-cells is an increase in their size; they take the stain less deeply and have the appearance of the decidua-like cells so frequently seen in the premenstrual endometrium or under any condition of increased vascularity (Figs. 2, 4). As the process continues the stroma-cells elongate and become spindle-shaped. Among these spindle-cells are seen not so many round cells as in the beginning of the infection, but many more than normal (Fig. 7). If the infection continues these spindle-cells ultimately assume a fibroblastic type (Figs. 10, 11). In all cases these changes in the type of the stroma-cells are most marked at first in the superficial portion of the endometrium, but if the infection continues the entire thickness of the mucosa becomes involved.

In many instances plasma-cells can be seen, but they are so difficult to distinguish from a round cell lying over a stroma-cell that it is not thought advisable to lay much stress on their presence.

Glands.—The changes in the glands include the changes in the epithelium, changes in the gland contents

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and changes in the number, shape and caliber of the glands.

The gland epithelium undergoes practically the same changes as have already been noted in the superficial epithelium, except that in the glands the process is much more frequently carried to the complete destruction of the epithelium and the consequent destruction of that part of the gland or glands involved (Figs. 6, 11, 12). Not infrequently epithelial cells will be seen which can be recognized as such by their relation to each other, but which taken individually cannot be distinguished from the modified stroma cells (decidua-like cells) found in the same field (Fig. 4).

In many instances the glands become filled up with round cells, leukocytes and broken-down epithelium. The round cells and the leukocytes get into the gland either by penetrating the unbroken epithelium or by the local breaking down of the epithelium, allowing them to pour in (Figs. 4 and 5). This filling up of the glands does not take place in all of the glands of any infected endometrium, but when it is present it may be seen in from three to a dozen glands in a section. The migration of the round cells and leukocytes through the superficial and gland epithelium is undoubtedly the source of the intermenstrual discharge which has so long been recognized clinically as one of the signs of infection of the endometrium.

The foregoing are the marked changes that are noted as taking place during the time that the cells of the endometrium are subject to the influence of an infection. There are, no doubt, some patients who recover so completely that no trace of the past infection remains. On the other hand, in the group of cases studied in the course of the preparation of this paper it was found that in every case in which the clinical history and local lesions pointed to an infection, either existent or preexistent, there was some recognizable lesion in the endometrium. These secondary results no doubt vary with the severity

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Fig. 1.—Section 874: M. E., aged 25, admitted to the hospital June 25, 1909; has had two miscarriages, the last one year ago. Last menses began June 14 and flowed ten days, bleeding very freely. She complained on admission of menorrhagia, profuse vaginal discharge, frequent micturition and pelvic pain. There was present an acute salpingitis. This field shows: *a*, an exudate over the superficial epithelium; *b*, superficial epithelium disintegrating; *c*, masses of round cells in the stroma.

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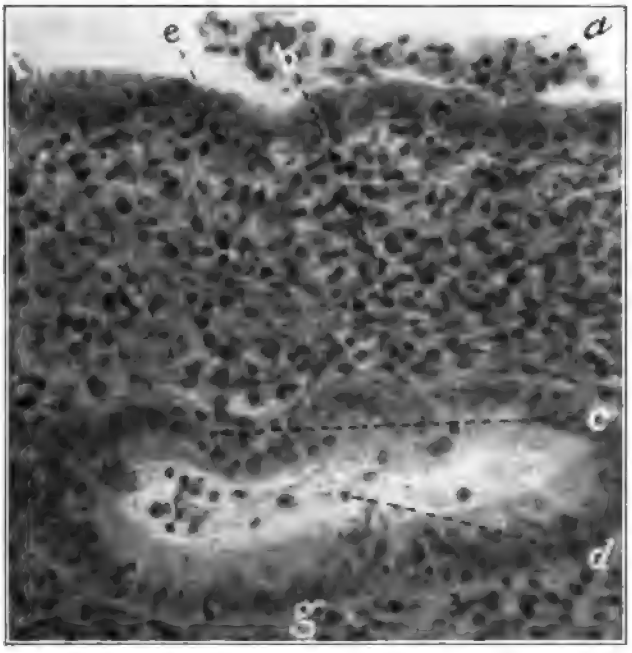

Fig. 2.—Section 836a, J. W., aged 20, admitted to the hospital May 5, 1909; had a miscarriage August, 1908. Last menses began April 20, and flowed thirteen days; since miscarriage the flow has recurred at regular intervals but has continued from ten to thirteen days. Patient had pelvic pain since August, 1908. Operation, May 7, 1909; curettement, infected tubes removed and uterus suspended. Infection probably dates from the time of the miscarriage. The field of illustration shows: *a*, round cells penetrating the superficial epithelium; *b*, round cells in the stroma; *c*, round cells penetrating the gland epithelium; *d*, round cells free in the lumen of the gland; *e*, the superficial epithelium has lost its columnar form, is rounded and swollen; *f*, the stroma cells are enlarged, rounded and approach the decidual type; *g*, the gland epithelium has lost its distinct shape and is beginning to disintegrate.

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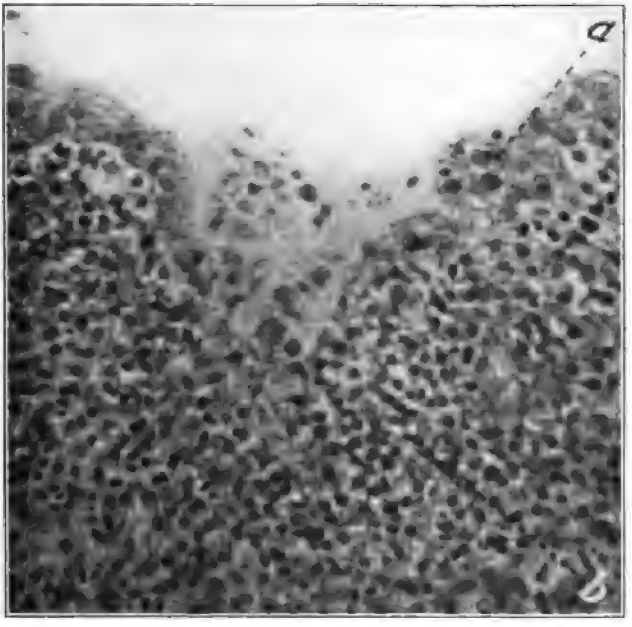

Fig. 3.—Section 836a (See clinical note to Fig. 2). This picture is from another field in the same section from which Figure 2 was made. It shows: *a*, the superficial epithelium is swollen and is breaking down; *b*, many round cells infiltrated among the enlarged stroma cells. The changes noted in these two figures were most marked in the superficial portion of the endometrium. In the deeper layers there was a very marked increase in the round-cell infiltration, but the glands were not materially affected.

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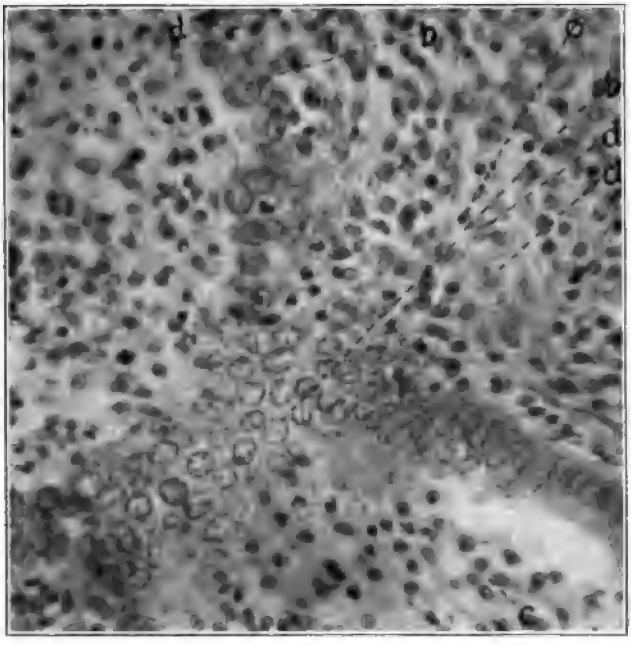

Fig. 4.—Section 872a; D. B., aged 36, admitted to the hospital June 19, 1909. Last pregnancy terminated at full term three years ago. Last menses two weeks ago, flowed seven days and very painful. Patient complains of pelvic pain and uterine hemorrhage; temperature after admission ranged from 99.5 to 101. Operation June 25, 1909; body of uterus and appendages removed. The tubes showed acute infection with much pus. This field shows: *a*, enlarged rounded stroma cells; *b*, enlarged and rounded gland epithelial cells; *c*, gland filled with round cells, leukocytes and broken down epithelium; *d*, round cells penetrating the gland epithelium; *e*, round cells in the stroma.

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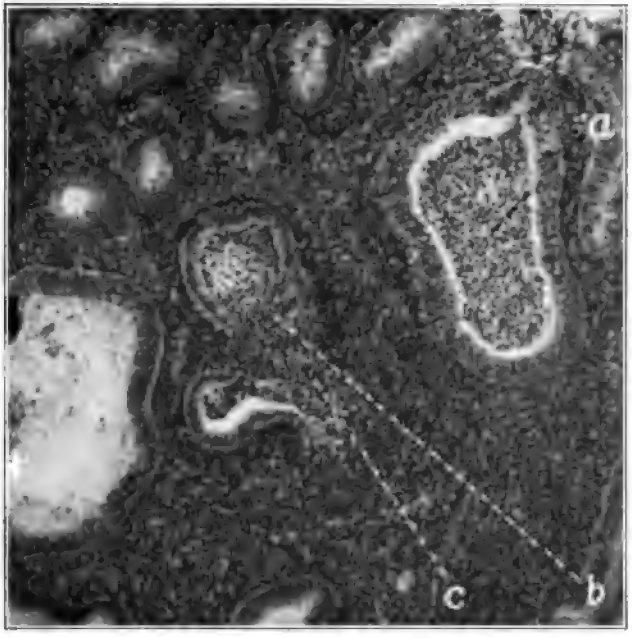

Fig. 5.—Section 431; J. E. M., aged 48, admitted to the hospital September, 1906. This patient was curetted in July, 1905, for the relief of a menorrhagia and leukorrhea that had persisted two years. The section from which the illustration was made is from the scrapings removed in September, 1906. The uterus at that time was not enlarged, was freely movable, and in normal position; the tubes and ovaries were normal. This field shows: *a*, gland filled with round cells and leukocytes; *b*, gland epithelium broken and round cells pouring into the lumen of the gland; *c*, masses of round cells in the stroma; *d*, irregular shaped, dilated gland; *e*, heavy type of gland epithelium.

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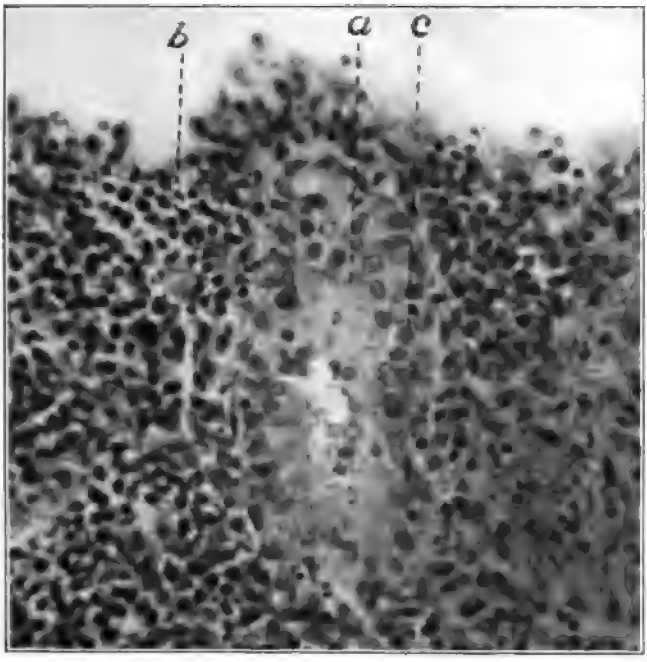

Fig. 6.—Section 846b; G. K., aged 30; admitted to the hospital May 13, 1909. Last menses began April 25, flowed seven days, regular, duration seven or eight days; leukorrhea for the past year; pelvic pain for the past five years, but suddenly increased two weeks ago. Operation May 18; supravaginal hysterectomy for infected uterus and appendages. Pus in both tubes and ovaries infected. The field here pictured shows the process of gland destruction: *a*, lumen of gland filled with disintegrating epithelium; *b*, round cells massed just outside of the gland; *c*, gland epithelium so modified that it can be recognized as such only by its position.

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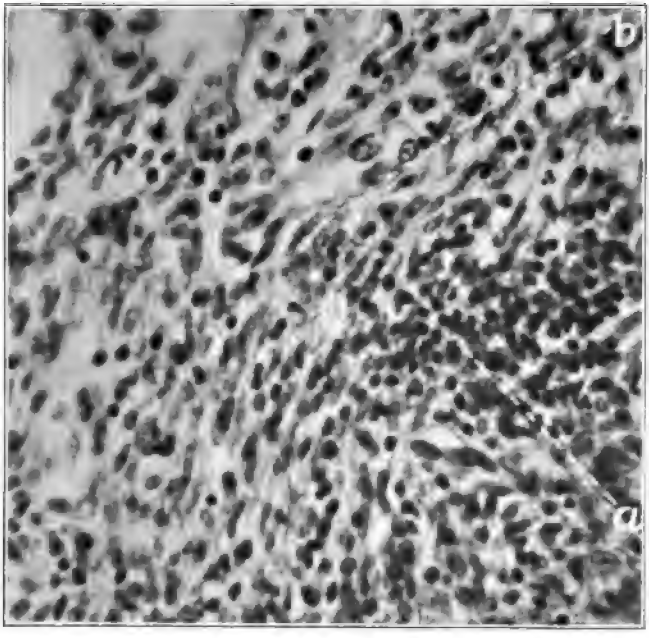

Fig. 7.—Section 846b. (For clinical notes see Fig. 6). This field shows: *a*, masses of round cells in the stroma; *b*, nearly all the stroma-cells have become spindle-shaped. These two fields from the same section show in the superficial layer (Fig. 6) a process that we recognize as an acute or recent one, while at about the middle of the depth of the endometrium (Fig. 7) are changes that are due to an older process. It is interesting to note that the clinical history indicates both a recent and an old infection.

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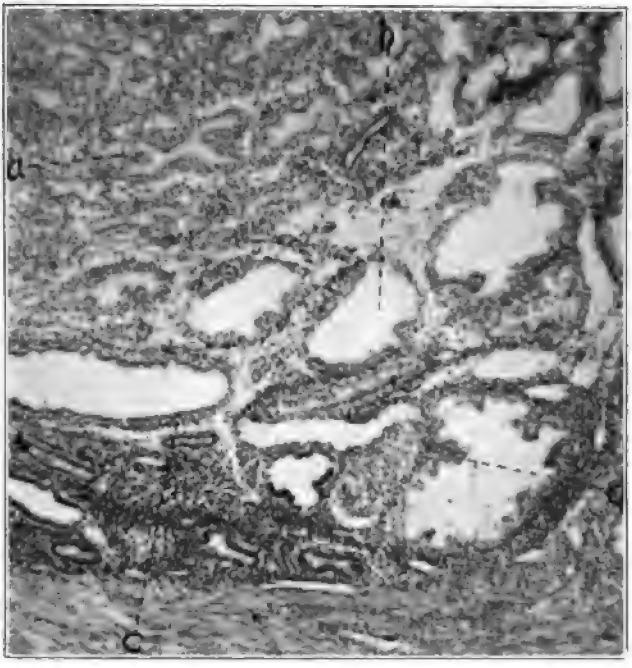

Fig. 8.—Section 662b; B. K., aged 29. Last pregnancy ended at full term seven years ago; last menses Jan. 18, 1908, scanty, irregular and painful. Patient had symptoms of an infection six years ago; cystitis three years ago. Operation Feb. 14, 1908; supravaginal hysterectomy for infected uterus and appendages. This field shows: *a*, glands in the upper layer of the endometrium, numerous, small and irregular in outline; *b*, glands in the deeper portion of the endometrium much dilated; *c*, gland epithelium consists of a single layer and much lower than usual; *d*, gland epithelium is tufted as it is in the glands of the premenstrual endometrium. Under a higher magnification the stroma is seen to be made up largely of spindle-cells interspersed with a few round cells.

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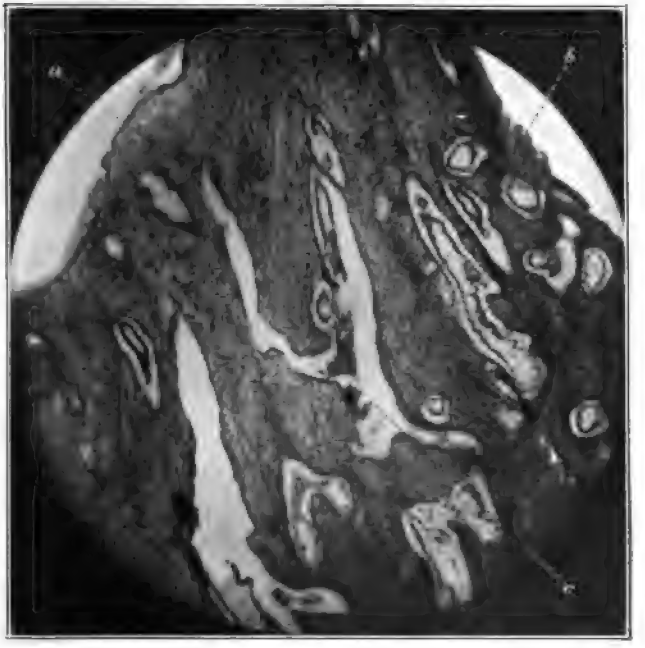

Fig. 9.—Section 688b; E. D., aged 27. One child born four years ago; last menses April 4, 1908, regular, flows three to five days, very painful. Patient has had pelvic pain, leukorrhea, dysmenorrhea and burning micturation since labor four years ago. Operation April 10, 1908; supravaginal hysterectomy for infected uterus and appendages. The tubes were full of pus. This field shows: *a*, glands in the superficial part of the endometrium contracted or absent; *b*, glands in the deeper part much dilated.

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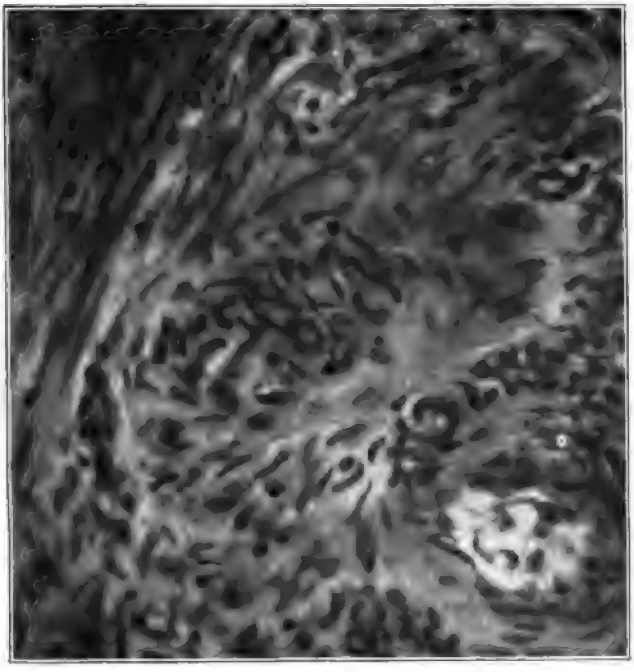

Fig. 10.—This is a higher magnification of the section shown in Figure 9. The field is about half way between the musculars and the surface of the endometrium. There is an absence of cells that even resemble the normal stroma cells.

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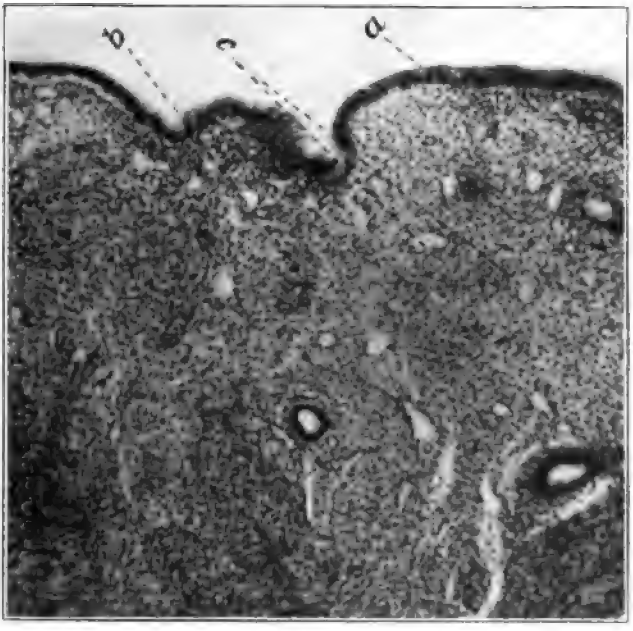

Fig. 11.—Section 799a: A. C., aged 47; admitted to the hospital Feb. 10, 1909. Last pregnancy terminated in a miscarriage eighteen years ago; last menses began January 7, and flowed sixteen days; up to three years ago menses were regular and the flow lasted seven or eight days, since then the periods have been irregular, painful and profuse. Operation Feb. 11, 1909; supravaginal hysterectomy. Associated lesions; uterine myoma, infected uterine wall, pyosalpinx, adenocystoma of the ovary. This field shows: *a*, superficial epithelium intact; *b*, almost entire absence of glands and the stroma cells are replaced by connective tissue; *c*, numerous blood-vessels. The remains of the endometrium is much thinner than the normal endometrium.

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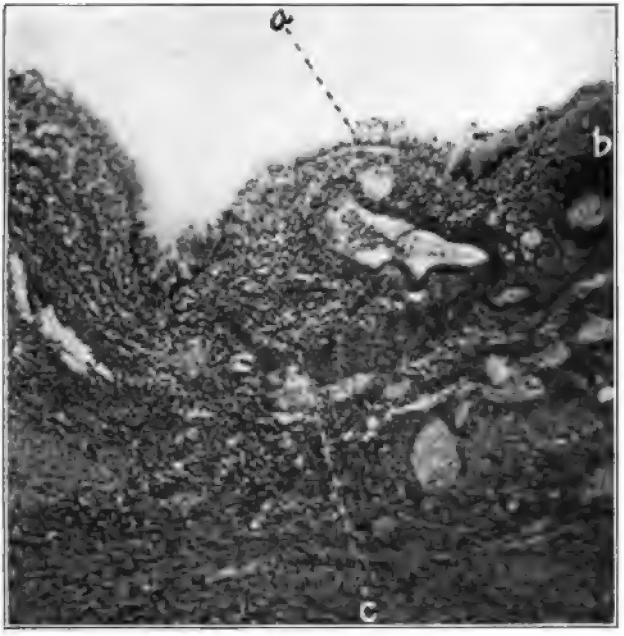

Fig. 12.—Section 680c; M. C., aged 49; last menses four years ago. First began to feel discomfort about one month before operation. This patient had an adenocarcinoma of the cervix that produced a complete atresia. The body of the uterus was larger than a man's fist and distended with pus. The section is shown to illustrate what happens to an endometrium in a pyometria; *a*, thinned out superficial epithelium; *b*, the remains of a gland; *c*, all this area is densely infiltrated with round cells which are also present in large numbers in the muscularis; very few glands remain.

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of the past infection and are not perfectly constant, but some of a very few conditions are practically always present.

The superficial epithelium, even where it has been partially destroyed, apparently is reproduced and is present as a continuous single layer (Fig. 11). In the stroma the round cells decrease to their proper proportion and the stroma-cells return to their normal ovoid shape and size, or retain a spindle shape, or assume the fibroblastic type. The glands in the upper half of the endometrium are found to be either numerous, small and angular (Fig. 8), or much fewer than normal (Fig. 9). The glands of the deeper part are frequently much dilated (Figs. 8, 9). This dilatation is quite different from the dilatation of the glands in the premenstrual endometrium. In the endometrium, after infection, the dilatation is apparently due to retention from destruction of the portions of the glands passing through the superficial part of the endometrium. The lining epithelium of these distended glands is usually thinned out by compression. In other instances the infection has been so severe that all, or nearly all, of the glands have been destroyed (Figs. 11, 12).

From this study of endometriums known to be infected we are in a position to say, with a reasonable degre of accuracy, that an endometrium under examination either is infected or that it is not infected; and usually, if there is no evidence of a present infection, whether it has been infected.

It is useless to attempt a classification of the results of infection, because it is possible to find all stages of the reaction to infection in the same endometrium.

6 West Preston Street.

ABSTRACT OF DISCUSSION

Dr. Emil Novak, Baltimore: That the endometrium reacts toward acute infection in much the same way as does any other tissue cannot be impressed too strongly. A more interesting and difficult problem is that of chronic infection of the en-

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dometrium and of chronic endometritis. If we assume that the endometrium reacts in the same way to a chronic process as do other structures we would expect to find in such cases a certain number of small round cells, perhaps fibroblasts, etc.

The next question is, are all cases with these findings to be classed as chronic endometritis, or, to make it even broader, are all to be considered as chronic infections? We must bear in mind that we often find fibroses of the endometrium in conditions which are probably not of an infectious nature, as, for example, after prolonged passive hyperemia. Whether or not fibroid changes in the endometrium are to be called chronic endometritis is therefore often a difficult question. I do not think we can tell in every case. It is much the same problem as if an individual is found dead on the street. One cannot tell whether he died of apoplexy, of heart disease, or of something else. We see the result, but we do not know what brought it about. So, whether there has been merely a prolonged hyperemia or an actual infection, the terminal condition in the endometrium is apt to be the same.

Another interesting question in this connection is that of the avenues of infection of the adnexa in cases of general pelvic infection. Formerly it was believed that in many tubal infections the process reached the tube through the lymphatics rather than by direct continuity. It seems to me that this paper throws light on this subject. If it can be shown, as seems to have been done, that in practically every case of tubal infection in which the endometrium was examined microscopically evidences of infection were found, it would seem that the infection must have traveled to the tube by way of the endometrium.

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AN IDEAL OPERATION FOR TOTAL PROLAPSE OF UTERUS

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NEW YORK

There persists, especially after several or instrumental labors, an elongation of the round ligaments and of the six consecutive-tissue ligaments associated with the uterus, and more especially the ligamenta cardinalia. There is deepening and sinking of the peritoneal pelvic recesses anterior and, especially, posterior to the uterus. Since the normal anteverted or anteflexed position of the uterine fundus is maintained only if the cervix is high up and far back, such descent of the cervix and fornices permits the fundus to drop back into retroversion, unless there be present unusually short and muscular round ligaments.

Slight ptosis of the uterus may occur with the fundus in anteflexion or anteversion, but marked ptosis of the uterus implies an associated retrodeviation. A retroversion or slight retroflexion permits abdominal pressure, among other accessory factors, to cause a ptosis of severe degree. Ptosis does not occur if there are no lengthened ligaments; if the broad ligaments are elastic or sclerosed; if the uterosacral ligaments are short; if there is no tugging by a loosened vagina; if there is no atrophy of the perivaginal tissues; if there is no injury to the levator ani muscles, etc.

If a severe degree of ptosis carries the uterus down no further than to the vulva, such a hysteroptosis may be defined by the term "descensus uteri." If the uterus

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descends beyond the vulva, the condition is called a prolapse. With marked ptosis of the uterus there is descensus vaginæ. The anterior and posterior walls of the upper vagina descend in association with any marked descent of the uterus. The nearer the portio uteri approaches the vulva, the more is the vaginal canal shortened until, in the more extreme cases, it too finally lies outside the vulva.

Injury to the fibers of the levator ani muscles, even when the perineum is not torn, results in a very flabby vulvar outlet, and when the perineum is torn, in a hernia of the rectum (rectocele). Many cases do not result in more than uterine ptosis, or retroversion or retroflexion, even when they develop cystocele, or both. Loss of the support which the levator ani furnishes the vagina may be of importance. In many cases the uterus is elongated, much enlarged, the cervix is thickened and hypertrophic and the vaginal mucosa very thick. There is subinvolution and, at times, atrophy of the elastic periuterine and perivaginal tissues. There is not infrequently associated with this condition, even in cases in which labors have not been numerous or instrumental, a state of general elasticity associated with flabby subinvoluted abdominal walls and with varying degrees of gastroptosis and enteroptosis. What effect may persistence of retroversion and descent associated with intra-abdominal pressure and accessory pressures have in such cases? It leads to further uterine descent, and then, if perivaginal atrophy, large vagina and thickened mucosa are present, we observe further vaginal descent; (1) vagina pushed down by uterus; (2) vagina pulling down uterus; or (3) vaginal descent occurring simultaneously with uterine descent, but primarily independent of it.

The pathologic factors may be grouped as follows:

1. Tendency to inelasticity.
2. Labor injuries, especially if repeated.
3. Subinvolution; ligaments, uterus, vagina, etc.

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4. Primary ptosis leading to retroversion. Since retroversion is present, attention has been paid to the displacement, and while this is an important pathologic factor, the elements of subinvolution, injury to the various muscles, atrophy and predisposition are overlooked.
5. Posterior enterocele and large descended fornix.
6. Large vagina.
7. Vagina loosened, giving no support.
8. Loosened vagina, actively tugging on the uterus.
9. Bladder torn from its fastenings.
10. Splanchnoptosis and intra-abdominal pressure
11. Vocation.
12. Age. Most of the extreme cases occur after the menopause age, when there is great atrophy of the elastic fibers.

In the most extreme cases all union of the vaginal canal with surrounding connective and elastic tissues has been dissolved; all relations of fornices to normally situated peritoneal or uterosacral structures has been altered; all attachment of the uterus to fixed points of the pelvic wall have ended in tremendous elongation or atrophy.

Surgically, therefore, we have to take into consideration the following points:

1. Bladder and anterior vaginal wall.
2. Retrodeviation.
3. Elongated uterus, hypertrophied cervix.
4. Roof of vagina, which should be restored to its former elevation.
5. Posterior enterocele.
6. Capacious vagina.
7. Descended vagina. } Levator ani.
8. Rectocele and perineum.

The first step in the operation is based on the vaginofixation operation of Dührssen.

The complete separation of the bladder[1] from its attachment to the cervix to the anterior wall of the uterus, to the lateral margins of the lower part of the uterus and to the anterior fornix and anterior vaginal wall,

1. The method employed in the separation of the bladder has been described in the International Journal of Surgery, May, 1909.

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permits this organ to shrink up to a very small size and permits of its dislocation into any desired relation to the uterus. It is, therefore, obvious that, if the uterus is now attached by its anterior surface to the vaginal flaps, so that the fundus lies up behind the symphysis, the bladder must of necessity then rest on the fundus and posterior wall of the uterus and can never again come into contact with any area of the anterior vaginal wall. It is desirable, before attaching the uterus, to resect such an area of the anterior vaginal flaps as will make a taut anterior vaginal wall, a wall of such nature that it neither permits the fundus to sag down into the vagina nor forces it too far back from intimate relation with the symphysis. In this new position of the uterus, the bladder assumes a new and permanent relation to the posterior uterine wall. It is not necessary, nor do I deem it advisable except in rare instances, to sew the peritoneum on the posterior wall of the bladder to the peritoneal covering of the posterior wall of the uterus at the level of the internal os.

Resection of the flaps and fixation of the uterus to the anterior vaginal wall may be carried out at this stage but fixation of the uterus to the resected flaps may be better allowed to wait until the next two steps of the operation have been completed, namely, the amputation of the cervix and the correction of the posterior enterocele. When the uterus is fixed to the anterior vaginal wall, I pass four sutures, two of heavy braided white silk and two of No. 3 chromic, through the edges of the anterior flaps and through the upper part of the uterine fundus. The fixation is best allowed to wait, but the four fixation sutures are carefully passed through the fundus, their ends are grasped by an artery forceps, and are subsequently threaded and passed through the vaginal flaps after the next two steps have been carried out.

A high amputation of the enormously hypertrophied cervix is now in order. The fundus is replaced within the pelvic cavity, with or without fixation to the flaps,

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and the cervix is pulled down beyond the vulva and lifted up toward the urethra. A transverse incision is made through the vaginal mucosa at as high a point as possible without entering the cul-de-sac of Douglas; the lower edge of the incision is grasped with a mouse-toothed forceps; and the index-finger covered with gauze, sometimes aided by short snips of blunt-pointed scissors, separates the vaginal wall from the posterior wall of the cervix up to the peritoneal fold of Douglas, and continues to dissect this peritoneal fold upward for a considerable distance from the posterior wall of the uterus. We still have the lateral wall of the cervix covered by a bridge of vaginal mucosa; this bridge is incised with scissors down to the actual structure of the cervix, first on one side and then on the other, and with its submucous connective tissue is peeled away from the cervix by upward rubbings of the gauze-covered thumb. It peels away from the cervix smoothly and easily up to the uterine arteries. In this maneuver, as well as in the dissection of the posterior vaginal wall, there is considerable oozing, which is of minor importance. Side retractors are introduced there, if necessary, the bladder is held out of the way by an anterior retractor and the cervix is amputated at the level of the internal os by the aid of scissors. If this amputation is carried on from one side to the other, or from the anterior wall of the cervix down through the posterior, cutting of the uterine arteries should be avoided. As soon as the canal of the cervix is invaded the thick anterior lip should be grasped with single-bladded volsellum.

After amputation of the cervix, the uniting of the vaginal mucosa around this new external os is begun, first at the posterior wall, No. 3 chromic catgut sutures being used and the vaginal mucosa being caught at least three-quarters of an inch from the edge in order to cover thoroughly the denuded lower end of the uterus. After the first suture is applied and tied, the others are

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applied close to this one, first on one side and then on the other, care being taken to take up the vaginal mucosa snugly, so as to allow of no reefs or pleats. In this way the surplus of the posterior fornix and of the two lateral fornices is done away with. The sutures are then applied to the lateral wall and then to the anterolateral walls. A large surplus of vaginal flaps is noted, which consists of the originally dissected anterior vaginal flaps plus the surplus gained from the posterior and lateral fornices. The flaps are drawn, first one and then the other, over to the opposite side, and a very large triangular area is cut away. Now the uterus may be attached to the remaining vaginal flaps, each of the four fixation sutures which have been applied in the uterine fundus being threaded separately and carried through the vaginal flaps near their upper end. These may now be tied, bringing the fundus into intimate relation with the newly formed anterior vaginal wall. The flaps below the fixation sutures are then united by interrupted sutures of No. 3 chromic, which pass through the anterior uterine wall at the same time; or else the tying of these sutures may be left until the complete dissection of the rectum from the posterior vaginal wall has been completed, for, if in some instances these fixation sutures are first tied, it is a more difficult procedure to carry out a thorough dissection and resection of the posterior vaginal wall.

The next step of the operation consists in a high colpoperineorrhaphy which includes an absolute separation of the rectum from the posterior vaginal wall to within ½ to ¾ of an inch of the newly formed external os.

Two single-bladed volsella are attached to the lateral margins of the vulva at a point which is to constitute the lower end of the posterior vaginal wall and the highest point of the new perineum. These are drawn apart (before this an intra-uterine strip of gauze is introduced); and a pair of curved scissors cuts a wide tape-

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like strip from one volsellum to the other along the lower edge of the exposed vaginoperineal junction. Three or more heavy artery forceps are applied to the skin edge after this strip has been cut away and are allowed to hang down so that, by their weight, a denuded area half an inch in width is apparent. The upper edge of this denuded area is picked up with a mouse-toothed forceps, and a sharp knife begins the dissection of this thick posterior vaginal wall from the underlying, readily bleeding connective tissues. After this dissection has been well begun from one volsellum to the other, three or more artery forceps are applied to this upper flap, the forceps are grasped in the left hand and the fingers are placed behind the flap and the separation is continued with the knife from the underlying tissue, and then continued by the index-finger covered with gauze. After the preliminary dissection with the knife has been well started, the separation goes on easily, occasionally aided with the knife or with blunt-pointed scissors, the operator being extremely careful to avoid cutting into the rectocele. Oozing is fairly brisk, but no attempt to check it with artery forceps need be made. The dissection should extend very far laterally, especially so into the lateral sulci in which rest the separated levator ani muscles. After the flap has been thus separated upward for a distance of two inches, it is pulled down taut and then bisected along the median line as far as the separation has been carried. Artery forceps are then applied to the highest points of these flap edges and the separation from the rectum upward and laterally is continued. As the separation extends higher the flaps are bisected in continuity and artery forceps are applied high up in succession. In this manner, the entire posterior vaginal wall is separated to within half an inch of its upper limit and very well into the lateral sulci of the vagina. The flaps are then drawn down, first on one side, and then on the other; a large area is

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resected beginning at each volsellum and extending upwards to the highest point of the dissected flaps.

If the uterine fixation sutures have not yet been tied, they are tied now, and the union of the edges of what now remains of the posterior vaginal flaps is begun with heavy chromic catgut beginning at the highest point and gradually approaching the perineum. Occasionally, one of these sutures is made to catch the connective tissue over the rectocele in order to reef it upwards. As a rule, this is not advisable, as pockets may be formed, but with each successively applied suture the rectocele is pushed upward by a blunt-pointed instrument. After several such sutures have been tied, it will be noted that the vagina has been reduced to a canal of very small caliber, and this part of the vagina may now be gently packed with iodoform gauze. We now have left a large denuded area with the outline of a rather high colpoperineorrhaphy and some of the bulging rectocele at the lower area still remains to be dealt with.

Since the rectocele is a hernia through separated or torn levator ani muscles, these or the fascia which covers them must be brought together in such a fashion as to lie between the new vagina and the rectum and hold the rectocele permanently in check. Inasmuch as the healing of such a large denuded area is promoted to a great extent by the use of the smallest possible number of sutures, I use for the perineorrhaphy with the very best results a No. 4 chromic catgut suture passed in figure-of-eight fashion and constituting a single stitch. A very long, heavy, slightly curved needle is used; the left index-finger is introduced for control into the rectum so that the needle may at no point enter the lumen. The highest area of the remaining denudation is brought into view by a pair of forceps applied to the upper angle; that is, to the last-applied chromic suture which united the newly formed posterior vaginal wall. The needle, introduced on the left side one-half an inch or more exterior to the volsellum, goes in deeply through

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the lateral area of the denudation under the levator ani muscle. It is then continued up along the left lateral edge of the denudation close along the vaginal mucosa and comes out above the last applied chromic suture, now held by an artery forceps. The needle is pulled through and with it the chromic catgut. It is now introduced on the other side of the median line and passed down between the exposed connective tissue and the rectal mucosa over the finger in the rectum half-way between the median line and the volsellum on the right side. As the needle passes lower down and gets within an inch of the skin, it is passed deeply through the tissue coming out half an inch from the skin margin. The needle and chromic catgut are now pulled through and are passed in the same fashion, but from below upward, midway between the median line and the volsellum on the patient's left side. It is then passed upward, the point of the needle being controlled by the finger in the rectum, and makes its exit at the upper angle of the denudation through the vaginal mucosa. It is then introduced on the other side of the median line, passes under the mucosa on the right lateral edge of the denudation until the point reaches the depth of the right lateral sulcus, and is thus passed deeply under the levator ani muscles and out external to the right volsellum half an inch or more from the skin edge. The needle and chromic catgut are then pulled through.

In order to make the union of the posterior vaginal wall more perfect, three chromic catgut sutures are passed (but not tied) through the edges of the mucous membrane, forming the lateral margins of the denuded area and out through a corresponding point on the other side. These are grasped by artery forceps each one separately. Sutures are now passed to unite the levatores ani of the two sides and form a bridge which is to restrain firmly the rectocele. One, two or three chromic sutures are passed by a well-curved needle deeply through the lateral sulcus of one side in which rests

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the levator ani and its covering of fascia and, then, through the other side in the same fashion. I have not found it necessary to dissect out through the fascia any muscle bundles of levator ani muscles. These one, two or three sutures are now firmly tied, and their influence in pushing up and holding back the rectocele is readily apparent. These are the only buried knots in this method of perineorrhaphy.

A pair of artery forceps is now applied to the middle point of the skin edge, the two ends of this long, single-stitch chromic suture are pulled on in seesaw fashion, gently but firmly, and that part of the single-stitch suture which has passed from one side to the other over the skin edges is seen to take its place at a point almost midway between the ends of the suture held in the hands and the artery forceps applied to what is now becoming the lowest point of the external perineal wound. When the two ends have been thus pulled on, the two lateral sides of the perineal denudation come together in absolute contact, and a triple knot is tied and cut; the three chromic sutures which were passed and held by a forceps are tied. They unite the lower end of the posterior vaginal wall.

Two or more chromic sutures are now introduced in the perineum itself to bring the skin edges nicely together, and the patient is catheterized. Strips of iodoform gauze are tucked into the vagina, and the sphincter ani is given a most thorough stretching. Then iodoform gauze is applied liberally over the vulva and perineum, and is renewed with sufficient frequency to keep this area dry. The perineum is douched several times a day, especially after catheterization or defecation, with a pitcherful of sterile aluminum acetate solution. Catheterization is continued for three or four days and the patient is then allowed to void, if she can. The bowels are permitted to act whenever the patient is so inclined, otherwise, medicine is administered by mouth on the third or fourth day.

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The intra-uterine strip of gauze which is usually marked by having a piece of chromic catgut tied around the end is pulled out without disturbing the vaginal packing on the third or fourth day. The vaginal packing of iodoform gauze is allowed to remain from five to eight days. The operation is attended with a minimum of shock, the pulse-rate in very few instances being over 90 at the completion of the operation.

134 West Eighty-seventh Street.

ABSTRACT OF DISCUSSION

DR. J. H. CARSTENS, Detroit: I should like to ask Dr. Bandler how old these patients are that he operates on, generally?

DR. S. W. BANDLER, New York: From 37 to 78. The youngest is 37.

DR. J. H. CARSTENS: That is the point that I was going to bring out. This is an operation on the order of the old operation of Martin of Berlin, of Mackenrodt and of Duhrssen. I do this operation once or twice a year because the women are young. They are in the child-bearing period, and anxious perhaps to have children, and I endeavor in every way surgically to save that capacity. But when a woman is over forty, if she is past the menopause, or if she is seventy-five, why in the name of conservatism should anybody try to devise and subject a woman to an operation that takes an hour and a half to preserve a little picayune piece of uterus? When you have a good for nothing piece of uterus, have sliced off a great piece of the cervix, have taken out the tubes so that she cannot become pregnant, then you preserve this litthe piece. What for I don't know. In this kind of a case you can do all kinds of plastic operations, without benefit. In such a case I just cut around the uterus, take it right out, stitch the two broad ligaments together, and make a little flap. The whole thing can be done in fifteen or sixteen minutes, with good results, and the woman is not subjected to an operation which takes an hour and a half or two hours.

DR. J. RIDDLE GOFFE, New York City: I quite agree with what Dr. Carstens has said in regard to the removal of the uterus. In all these cases in women approaching the menopause, or afterward, it is my invariable rule to remove the uterus. I see no reason for keeping it. It shortens the operation very much and makes sure of good support from the broad ligaments.

The point I would criticise in Dr. Bandler's operation is that he separates from the cervix at either side the strong structure at the base of the broad ligaments, viz., the

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fibromuscular structures called the cardinal ligaments. Unless that support is retained, even though you do as complete an operation as has been described, sooner or later that little piece of uterus is going to come down. No matter how thoroughly the perineum is built up or how securely the fundus is stitched to the anterior vaginal wall, unless, as I say, these cardinal ligaments and the round ligaments are preserved and support from them secured, sooner or later the vagina will turn itself inside out, and while the fundus will not be seen at all, the cervix will come down and drag the bladder after it. I have seen such conditions after operation. There may be some cases, as Dr. Carstens says, of women who desire to have children, in whom it is well to preserve the uterus. I have done the operation with that intent. After the uterus is removed my method is to stitch together the broad ligaments from either side across the pelvis, commencing with the round ligaments, carrying my sutures down the full width of the broad ligaments, including the cardinal ligaments. Upon this plane of tissue I spread out the bladder, stitching it firmly at three points, thus hanging it there and securing its support from above. The fascia lata and anterior vaginal wall are then trimmed off and stitched to fit snugly the base of the bladder. It is important to relieve the rectocele. A rectocele, if continued, is bound to pull the uterus down. In a rectocele we have introduced a new force which is not there naturally at all, a pulling force that drags down whatever is above and unless we repair the floor of the pelvis the prolapsed condition is reproduced. My method of doing that is to start from above where I have cut away the peritoneum posteriorly to the cervix, dissect down a broad piece of tissue the full width of the rectum, clear down to the vulva and out on either side to get hold of the levator ani muscles. Where a large rectocele is present I plicate the rectum, taking in the slack in its longitudinal axis, and then bring together the levator ani muscles from either side in front of the rectum to restore the floor of the pelvis.

Dr. F. F. Lawrence, Columbus, Ohio: The questions occur to me: Why do we have prolapse? Why is it that in quite a goodly number of women who have had their perineums torn almost to the rectum they go on for years without even a slight descensus? It seems to me that when we start on the theory of building up from below in a case of complete prolapse or any other marked descent of the uterus we are getting the cart before the horse absolutely. In the first place, a marked retroversion is a physical impossibility, much more is a prolapse an impossibility, so long as the broad ligament is sufficiently tense to sustain the weight of the abdominal contents, not only against normal weight, but against deep inspiration or pressure about the waist from corsets or from clothing. And we may repair from below all we please but we have not relieved the ptosis within the abdomen and

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consequently the weight of the entire abdominal contents will be on the top of our downward repair and sooner or later with even no recurrence of the prolapse of the rectocele and the vesicocele we will have the women in constant pain because of pressure on the compressed scar tissue. I do not believe (as Dr. Carstens has just so emphatically said) that we are justified in doing any prolonged tedious plastic operation creating an enormous amount of scar tissue which never amounts to anything anyhow, leaving the real cause of the difficulty which lies above. We must restore the tension of the broad ligament to sustain the contents of the abdomen first. Then simply by the repair of the rectocele and the cystocele we shall render all the service we are able to do.

Dr. J. M. Baldy, Philadelphia: This operation does not deal with the essential point of prolapsus uteri. A nice operation is done on the vagina but nothing is done after the uterus is put back into the pelvis to push it up to the normal height and to hold it there. If this is true you fail in everything, because all the pressure that tears the uterus loose will still be operative. Any operation that fails to deal with that *per se* condemns itself. The amount of denudation done is simply enormous. Passing the fingers into the rectum with or without gloves—and gloves make them dirtier than without—you add to the chance of infection.

Dr. S. W. Bandler, New York: I am not at all worried by this tirade. I have not come here and presented to you an idea. I have been working on this vaginal route for fourteen years. I tried to cure these patients originally by a simple vaginal fixation and found it was by no means enough. I added to that the high amputation of the cervix, and found that was not enough. I tried amputating the cervix and special method of getting the two large flaps before fixing the fundus in front. That was fine, but still not enough. But since I diminished the caliber of the vagina and did a high perineorrhaphy not a case has recurred. Where would we be to-day in surgery if its great men said "Don't do this or that operation because it is a long one or a bloody one?" When men like Dr. Baldy talk this way it is child's talk. These patients even at the age of 75 go back to bed with the pulse almost normal in rate. I am not excited in making such remarks, only enthusiastic. I am not here to claim that this is an entirely original operation. If I had had opportunity to finish the paper I would have stated that it is founded on the principle of vaginal fixation as described by Duhrssen and Mackenrodt. What does Dr. Carstens propose to do? I have always admired him for his work. He now speaks of taking out the uterus in ten minutes. It is the hardest thing in the world to keep ourselves from doing a hysterectomy in these cases because it is so easy, but this does not cure the patient; nor have we supported the bladder. When Dr. Carstens removes the uterus he does not cure the prolapse of the vagina

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or the cystocele. I did that operation in 1900, 1901 and 1902 and the patients would come back with the bladder down. Here is an operation that is a beautiful thing because the cervix is placed high up and far back. The uterus does not descend in the way Dr. Baldy says. Dr. Baldy says I do not lift that cervix up. I do lift it up. I do a high amputation to make the uterus so short that when the intra-abdominal pressure pushes the fundus down the new cervix rises up and back. There will be no new cystocele. Hysterectomy for total prolapse! It is child's talk. Don't forget that the vagina is very capacious in these cases. When you fix the fundus back of the symphysis and it is fixed good and hard, so that it will stay; when you amputate that cervix and do the operation so that you take away the posterior enterocele; when you diminish the caliber of the vagina so that it scarcely admits two fingers by resecting the posterior wall, and do a high perineorrhaphy, then you have a fine complete operation. If these women did not complain we would not do the operation. By this method I have never lost a case, I have never perforated a bladder and have never cut a hole in the rectum.

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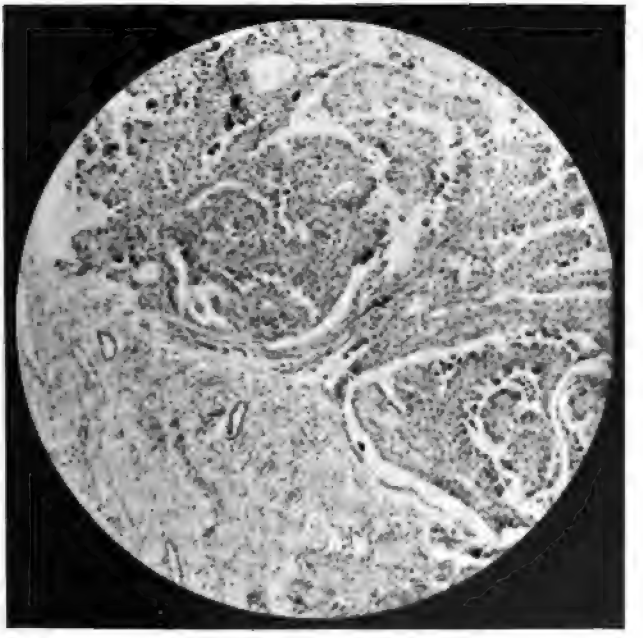

Fig. 1.—A papillomatous pedicle springing from modified kidney structure (× 100).

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Fig. 2.—A loosely spread portion of a papillary growth (× 100).

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Fig. 3.—Shows cyst wall and areas of hemorrhage (× 100).

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Fig. 4.—A small cyst and papillary growth inside (× 100).

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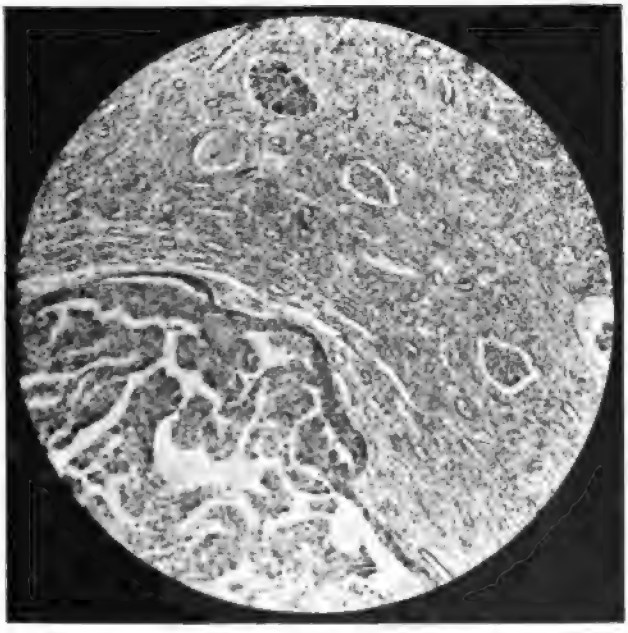

Fig. 5.—A portion of a cyst, and a portion of modified kidney cortex which contains Malpighian bodies and numerous tubules cut in various directions (× 100).

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Fig. 6.—After hysterectomy and nephrectomy; spinal deformity from caries of three upper lumbar vertebræ.

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PAPILLARY CYSTADENOMA OF THE KIDNEY, ASSOCIATED WITH MYOMA OF THE UTERUS AND SPINAL CARIES

GEORGE ERETY SHOEMAKER, M.D.
Gynecologist to the Presbyterian Hospital
PHILADELPHIA

Summary.—The patient presented an unusual series of lesions, namely, uterine myoma with hemorrhage, spinal caries and kyphosis, together with a large bleeding tumor of the kidney. Hysterectomy was first done for the myoma. The kidney hemorrhage filled the bladder with firm clots which decomposed; a vesicovaginal incision gave exit to the offensive clots and averted infection of the kidney growth. The latter was removed by nephrectomy and later under local anesthesia the vesicovaginal fistula was closed. The patient recovered.

History.—M. J., aged 27, married, sterile, was an overtall thin mulatto woman. On admission to the Presbyterian Hospital she was able to give little history except that of irregular hemorrhage from the vagina for a year, at times severe. The day before admission the urine was bloody also, but she had not clearly distinguished the uterine from the urinary bleeding in the past. For two months she had noticed a tumor in the left upper abdomen. There had been a little pain for a month in the left lumbar region, over the left iliac crest and in the left thigh and the legs. There were well-marked syphilitic scars about the anus and legs. The urine was negative except for abundant blood. As the hemoglobin was 28 per cent. and she was losing blood freely from the uterine tumor, abdominal hysterectomy was done as a first step. An interstitial uterine growth reached nearly to the navel, which the pathologic laboratory reported as a myoma of the uterus with no unusual features.

Recovery from the hysterectomy was aseptic, but about two weeks afterward the hemorrhage from the tumor of the left kidney, which had been absent since admission, began again and soon became serious. The bladder filled with firm clots,

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which became infected and highly offensive. The cystoscope showed blood coming from the left ureter, and, while it might have been possible to break up and remove clots with an evacuator, the process was not without danger and would probably have to be repeated. With the large mass present involving the lumbar spine as well as apparently the left kidney, not the slightest chance of infection through the bladder could be taken. Therefore a large vesicovaginal opening was made, attaching together the mucous membrane of the bladder and vagina. Removal of the clots and irrigation through this fistula promptly cleared up the bladder infection and maintained a clean field while the kidney was attended to.

Examination of Tumor.—What appeared to be a kidney tumor reached 2 inches below the navel on the left side, filled the whole left upper quadrant and was lost under the ribs, which were forced outward and forward. The enlargement produced by the tumor continued around behind where it joined another swelling to the left of the three upper lumbar vertebræ. These projected backward out of line. The swelling immediately to the left of the diseased vertebræ was deep-seated between the ribs and the spine. There was tenderness, but no definite fluctuation and no redness of the skin. The questions for decision were whether the abdominal tumor was directly continuous with the tumor of the spinal column; or whether the spinal disease was a caries and separate from the other tumor, while lying in contact with it; and, as the masses could not be separated by examination, whether an attempted nephrectomy would open up the spinal area or not. A well-marked bruit and thrill behind suggested an aneurism eroding the vertebræ, but it was found that these symptoms appeared only when the patient lay on the right side. Indeed, the kidney tumor proved to be suspended from its upper portion with some range of mobility below, so that with change of the patient's position it would swing against the aorta, giving rise to the bruit. The skin test of von Pirquet for tuberculosis was negative. The *x*-ray photograph showed necrosis and posterior displacement of the three upper lumbar vertebræ, apparently from intrinsic disease and not from erosion. Aspiration to a depth of 2 inches in the swelling to the left of the spine yielded dark, thin, bloody fluid. On this the report of the pathologic laboratory by Dr. Canby Robinson was sterile blood with excess of serum. Cultures and smears were negative for tubercle bacilli and other organisms. In the determination of the sufficiency of the other kidney, indigocarmin solution was injected into the buttock mus-

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cles by Dr. Laws. The cystoscope then showed active spouting of blued urine from the right ureter in eighteen minutes, while the blue stain appeared much more slowly on the diseased side, and the spurts were very feeble and infrequent. The blue stain was very faint on the left. This proved the relatively greater activity of excretion on the sound or right side, and as there were no casts, while the total twenty-four-hour quantity was good, nephrectomy appeared safe. Dr. Willard concurred in the opinion that the main mass was a renal tumor, probably separate from the tender swelling near the spine and that this was secondary to spinal caries. Operation proved the correctness of this view.

Operation.—Through an incision 8 inches long forward over the tumor from the edge of the quadratus lumborum, the entire tumor was enucleated and proved to be a greatly enlarged left kidney. There was no evidence of infiltration of surrounding tissues. Owing to the inaccessibility of the stump, two curved hemostatic forceps were left attached to it, no ligatures being applied.

Postoperative History.—At the end of forty-eight hours these were unfastened, one being removed entirely on the third day and the other, which had appeared to be adherent, on the fourth day. There was no hemorrhage, and aseptic healing followed. Eighteen days after the nephrectomy, the vesicovaginal fistula was successfully closed with no pain under local anesthesia. Two per cent. eucain solution and 1 to 20,000 adrenalin solution were injected into the tissues of the vesicovaginal septum.

When studying the kidney functions prior to nephrectomy in this patient, the presence of the vesicovaginal fistula prevented the distention of the bladder with water or air to facilitate cystoscopy. As reported to the Philadelphia Academy of Surgery[1] I overcame the difficulty by introducing a finger-cot partly through the fistula and then distending the cot with water. This tightly closed the fistula for the time and made cystoscopy easy. Four weeks after the nephrectomy, when the patient, wearing a plaster jacket for the spinal caries, was nearly ready for discharge from the hospital she suddenly developed a motor paralysis of both lower extremities without impairment of sensation. She had previously been moving freely about the bed. This impairment increased rapidly for seven days after which some improvement in motion occurred. The patient became unwilling to wear a

1. Shoemaker, G. E.: Ann. Surg., December, 1909.

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plaster jacket and was discharged at her own request forty days after the nephrectomy.[2]

Microscopic Examination of Tumor.—Dr. G. Canby Robinson, the pathologist of the Presbyterian Hospital, kindly contributes the following description of the microscopic appearances of the renal tumor: "The tumor mass, which measures 18 by 12 by 9 c.m., takes roughly the shape of an irregularly enlarged kidney. It is roughened by slightly bulbous swellings, especially at the lower end. These swellings have a dark red and purple color. The tumor is firm in consistency. In one place there is a cavity which appears to be the remains of the pelvis of the kidney. On section the kidney is found to be almost replaced by a tumor mass and only at the upper end is kidney tissue seen. Here the cortex is pale, almost white, and swollen, and glomeruli cannot be seen. The tumor structure is pinkish-yellow in color and rises slightly above the cut surface, through which fine bands of connective tissue run. At places the tissue is opaque, while in some areas it is translucent and colorless, resembling hard starch. Microscopic sections show kidney tissue only occasionally. When it is seen, there are a few glomeruli and compressed tubules scattered through large masses of connective tissue. The tumor is composed of fine strands of connective tissue, which grow out apparently from the increased connective tissue of the cortex, and which extend in a branching papillomatous manner in all directions. The connective tissue forms a stroma of the main tumor cells which lie on both sides of the fine connective tissue strands. There are large cuboid or columnar epithelial cells, practically always lying in a single layer, possessing large vesicular nuclei with nucleoli, and resembling large tubular epithelium. Tubule-like structures are often seen. Cysts formed by the walls of connective tissue and epithelium are frequent, and small masses of blood are present. The epithelial cells do not appear to have undergone malignant changes, but in one or two places small nests of cells are arranged in a rather suspicious manner."

Diagnosis.—Papillomatous cystadenoma of the kidney. No definite signs of malignancy.

Watson and Cunningham[3] state that the adenomas of the kidney are both malignant and benign.

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2. August, 1910, ten months after nephrectomy, patient is reported as doing light housework.

3. Genito-Urinary Diseases, II, 231.

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The papillary type usually prevails, but the alveolar is likewise common. The relation between the benign and malignant adenoma is obscure. The majority of pathologists believe that the two are identical, and that they differ from each other only in a clinical sense. There are transition forms from adenoma to carcinoma, although the transition is not a sharp one. It is probable that many of the malignant adenomata are benign in the first place, and that malignancy supervenes. It is impossible to say how long the disease has existed in the benign form, because the tumor may be unrecognized for many years.

In a series of ninety-one tumors of the kidney examined at the Massachusetts General Hospital, four were of the type of large papillary cystadenomata of the kidney.[4]

The accompanying photomicrographs of the tumor tissue illustrate many of the characteristic features of the disease.

4. Nelson and Cunningham: Genito-Urinary Diseases, p. 220.

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THE USELESSNESS OF LOCAL TREATMENT IN PUERPERAL SEPSIS

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DETROIT

When I was in active obstetric practice, twenty-five or thirty years ago, I saw many cases of puerperal sepsis, especially in consultation and coming from the hands of midwives. We were then just beginning to practice antiseptic midwifery and our great object was to kill the germs. Hence, we began to use various remedies that we supposed would destroy micro-organisms, such as phenol and mercuric chlorid, and I used these faithfully as vaginal douches and by intra-uterine irrigation. Then the fad of iodoform started, and I plead guilty of even introducing the stinking suppositories into the uterine cavity and letting them melt there.

But it soon was clear to me that there was not much difference in the ultimate result, no matter what kind of local treatment we made use of—that the real aim was asepsis, the prevention of puerperal fever.

I then found the best result by cleaning out the uterus gently with a little absorbent cotton or gauze on a swab, carefully wiping it dry, and then swabbing it out with pure phenol. My idea was that by curetting the lymph-channels were opened and raw surfaces were made, and thus better chance was given for absorption, while by simply mopping the uterus out any little detritus and secretion which might contain bacteria were rubbed away, and if any small raw surfaces existed, by cauterization with pure phenol they were closed and covered,

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thus preventing absorption and at the same time perhaps destroying all the micro-organisms that existed there. But even this mode of treatment I doubted, and finally stopped that also, depending altogether on constitutional treatment.

I have always had unbounded faith in the use of quinin, holding that it inhibits or checks the ravages of micro-organisms and toxins in the blood, but in our present light it seems to me that it probably supplies some opsonin. Then I believed in elimination, and kept the bowels free, and gave the patients large quantities of water to flush the kidneys constantly. This mode of treatment seemed to give as good results as the heroic local treatment which was all the rage, if not better.

In connection with puerperal sepsis there is another thing to be considered, and that is the kind of micro-organism which causes the trouble. In most cases it is the streptococcus, pneumonia, diphtheria, grip or colon bacillus—sometimes a mixture of two or more. These all seem to cause more or less local disturbance, with a good deal of pain, but I saw a number of cases of puerperal sepsis in the course of my practice which absolutely produced no symptoms. The patient, when asked how she felt, replied, "Very well." Asked if she had any pain, she would say "No." The abdomen would be perfectly flat; no localized tenderness or pain anywhere; patient was feeling all right, taking nourishment, bowels moving perfectly; in fact, all the bodily functions apparently in good condition. The only thing she might complain of was a nervousness, lack of sleep. On looking at a patient like that and talking with her one would say that there was nothing the matter with her, but on putting a thermometer in her mouth one would find the temperature 105, 106 or 107, and over, with a pulse of 120 to 140, and it would be clear that she was seriously sick.

Now this peculiar type of puerperal sepsis, I hold, is due to a special micro-organism that has not yet been

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isolated or discovered. One may find the streptococcus in the secretion, but one finds the same in other cases, with no such symptoms. In this peculiar type of puerperal sepsis the patients will drag along for four, six or eight weeks, and finally recover, although some will die —I should say 25 to 30 per cent.

As far as the local symptoms and manifestations are concerned, in the general run of cases, I find them of two varieties: one in which the infection travels up the uterus into the tubes, causing septic peritonitis, generally of a severe grade; and another variety in which the infection travels along the lymphatics as the result of an abrasion, especially a tear in the cervix, and the whole symptoms of the disease seem to develop in the broad ligament and in the cellular tissues of the pelvis, from there spreading in the direction of least resistance, sometimes behind into the cul-de-sac of Douglas, and breaking into the rectum spontaneously in fortunate cases, or working up toward Poupart's ligament, where it can be readily opened. Cases of the latter kind last for weeks and sometimes months, and the patient generally recovers.

The point I want to make is simply this, that by local treatment more harm is often done than good. Douches given by ignorant persons often implant new and virulent micro-organisms within the genital tract, while scraping and curetting and injuring the delicate mucous membrane opens new channels for absorption.

When a localized abscess is formed which can be opened into the cul-de-sac of Douglas or somewhere else, I certainly believe it should be promptly opened, but as we see the disease generally several days after its onset, I think no local treatment will be of any avail. Experiments made on mice with anthrax bacillus have shown that if the bacilli are appplied to a raw surface and removed ten minutes later and the parts cauterized the treatment will have no effect, but the animal dies of anthrax. The human system may have a greater resist-

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ing power; still, after twenty-four hours or more such an amount of absorption has taken place that the removal of the discharge can do little if any good. Continued irrigation, it has been shown, cannot keep the parts clean, nor can douches or irrigation twice a day have any effect.

I have been all the more desirous of bringing this view before our section since reading the proceedings of the last German Association of Obstetricians, where Winter, in an exhaustive article, shows this most clearly, coming to the conclusion that simple absorption ceases as soon as the necrotic tissue is cast off; that simple local infection and endometritis stops soon without any treatment; that no local treatment will prevent deep or general infection, and that when absorption takes place and there are remnants of tisue still in the uterus, one should be tardy about removing them, as these are generally quickly cast off and the patient gets along just as well as with the most vigorous treatment.

In the present state of our knowledge it seems to me that we should discourage as much as possible the indiscriminate local treatment made use of during the last decade or two; that any remnants of tissue should be most gently removed; that local abscesses should be opened at the right time, that is, in a week or two, and that intra-uterine and vaginal douches should not be made use of. With a clearer knowledge of bacteria, and especially the development of antibodies in the system, we should encourage as much as possible the development of antibodies and the elimination of toxins, by flushing the kidneys, keeping the bowels open and favoring diaphoresis. At the same time we should try to get a culture of the infecting micro-organism so as to know what we have to deal with, and by the use of antitoxins increase the opsonic index sufficiently to carry our patient to a successful issue.

SUMMARY

1. In puerperal sepsis, local treatment is of no benefit.
2. Douches and intra-uterine irrigation often do harm.

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3. Local abscesses should be opened and allowed to drain without irrigation.

4. Constitutional treatment, on general principles, should be instituted, quinin and opium being the sheet anchor.

5. Elimination in every direction should be assisted.

6. The infecting organism should be identified and the opsonic index increased by antitoxins.

7. And, after all, prevention should be our constant endeavor, a clean patient and clean doctors, and midwives; this is most often secured by wearing rubber gloves.

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ABSTRACT OF DISCUSSION

DR. E. GUSTAVE ZINKE, Cincinnati: The local treatment of puerperal sepsis is never to be discarded; it is of great importance, and should be better understood. Before we proceed with the treatment of puerperal sepsis, however, we must first determine with what form of sepsis we are dealing. There are two distinct varieties of puerperal infection and a sharp line must be drawn between the two. In one instance, the most frequent, we deal with the saprophytes; in the other, with the streptocccoci. In the former, if the infection is recognized early and the uterine cavity promptly cleaned, the temperature at once subsides and the trouble is at an end, as a rule. The cases of so-called sapremic infection, or wound-intoxication as the Germans call it, begin in a very mild manner. The pulse remains normal for sometime and the temperature rises very slowly. If the case is not recognized promptly and the necrosis, produced by the saprophytes, becomes extensive, there results, in time, a so-called putrescent endometritis and then the symptoms gradually become more severe and the evidence of systemic infection is much more profound. In these cases local treatment is of prime importance. The gentle cleaning out of the uterine cavity, followed by a copious antiseptic uterine irrigation (ten or twenty quarts) is often sufficient to cause a prompt recovery. Should the temperature rise again, the irrigation may be repeated within twenty-four or forty-eight hours, but this will rarely be necessary.

It is different when the streptococcus has invaded the parturient tract, which is the so-called wound-infection of the Germans—the true septic infection. When the streptococcus gets into the birth canal, especially within the cervical lacera-

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tions or, which is worse, within the placental site, a profound systemic disturbance manifests itself at once and the temperature runs up quickly to 106 F. and more after a chill of some duration. The pulse, too, goes up promptly to 120 and over. In these cases the germs immediately pass through the wounds into the blood or lymph-vessels, or both, beyond reach. But even here the entire parturient canal must be kept clean in connection with the constitutional treatment. The serum-treatment, if resorted to early, will give the best results.

Dr. Horace G. Wetherill, Denver: As usual Dr. Carstens has stated his opinions forcefully and, as usual, he is, in the main, correct. I think we shall all agree that, on the whole, intrauterine treatment following septic infections, particularly the use of the curette, has been injurious. Dr. Carstens' treatment seems to me to be much too broad, however, and it ignores one of the most important of the accepted surgical principles; —the drainage of an infected cavity. Many times each of us has found a large amount of septic putrid material bottled up within the uterine cavity. The principle of drainage which we apply to infected cavities everywhere should be applied to the uterine cavity under these conditions. If we use drainage, and if it can be used without the risk of a retrograde infection, why not use irrigation as well? A drainage device which I have used for this purpose for several years is a double tube so constructed that it is possible to irrigate through one leg of the tube and get the drainage from the other. With a tube of this kind connected with a fountain syringe continuous irrigation may be employed, if it is desired. If this is done with a permanganate of potassium solution, or better still, with alcohol (30 to 50 per cent.) there is absolutely no danger of poisoning.

Dr. H. J. Boldt, New York City: The whole matter resolves itself into a question of diagnosis, and I believe that is what Dr. Carstens really meant. We realize that when we have to treat bacteriemia, local treatment as such, if the system is overburdened with streptococci, becomes absolutely useless. He has also told us, and it is absolutely correct, that purulent material, such as decidua, or perhaps a piece of retained placenta, left in the uterus, is, as a rule, spontaneously cast off in a short time without in all probability causing a very serious disturbance, except temporarily. Dr. Carstens has particularly advised against the use of a curette; that is the chief point which he brought out. To abstain from local treatment, when a septic infection is local, it is not our purpose to confirm such an idea, but whenever we have a severe local septic infection, as for instance from the external genitalia, it is our duty to look after that. If we have reason to believe that there is foreign material in the uterus which is not soon cast off from the uterus

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spontaneously, and if the cervical canal is patulous, which is usually the case, then we should enter the uterine cavity and remove the pathologic material as far as possible with care; but the point is, not to cause traumatism, because traumatism on the puerperal tract will open the avenues for septic infection.

Dr. Henry Schwarz, St. Louis: I agree with Dr. Carstens in the conviction that prophylaxis is the main thing. I want to emphasize what he said about the use of rubber gloves, clean hands and clean instruments as the greatest factors in preventing loss of life by septicemia. I agree with Dr. Boldt, that diagnosis of the nature of the infection is of the utmost importance, and I insist on a bacteriologic diagnosis in all cases which are used for statistical purposes. The only variety of septicemia which I wish to discuss here, are the cases of general bacteriemia in which the streptococci are found in the blood. When you can get a culture of streptococci from the blood, it is my experience that, as a rule, nothing in the world can save that woman; these fatal cases of streptococcus infection are all cases in which the germs are brought to the patient by the doctor or by the nurse, or by the instruments; these cases can be prevented and they must be prevented.

I want to warn against the use of bacterial vaccines in these cases of puerperal septicemia; I mean against the injection of killed cultures of streptococci into the system of a woman, whose blood contains already billions of living streptococci. You can not hope to increase the formation of antibodies by so doing, for the living streptococci have already caused the formation of all the specific antibodies which the blood of this respective patient can form; the use of anti-streptococcic serum in these cases is logical; it should be given in large doses frequently repeated; it can do no harm.

The brilliant results obtained with bacterial vaccines in furunculosis and other chronic conditions make it likely that in the localized form of septic infection good results may likewise be obtained from the careful use of streptococcic vaccine, but, I protest against the indiscriminate administration of this vaccine by the general practitioner, because by temporarily lowering the resisting power of the body, that may enable streptococci causing a local infection, such as a pelvic cellulitis, to overthrow the natural defenseworks of the body, and thereby change a local infection, which is curable, into a general one, which may prove fatal.

Dr. J. H. Carstens, Detroit: If the uterus is flexed and retains septic material I would expect any one to straighten it out and establish drainage. What do we do in appendicitis? We open the abscess, put in a little drainage tube, and that is all. We do not irrigate. The abscess is filled with micro-

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organisms of all kinds. Why should we dissect and wash and douche, and so on? I have taken intestines and put them under a faucet and let the water run on them for twenty-four hours, and still the micro-organisms were there. The nurse may clean the uterus out two or three times a day, but I do not believe that it does any good. Many patients have died who would have lived if they had been let alone. I plead for the constitutional treatment by the elimination of the micro-organisms. If they are eliminated from the system then the patient will have a chance to get well.

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PLASTIC SURGERY OF THE PELVIC STRUCTURES

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As the members of this Section know, this is not the first time that I have addressed it on the subject chosen. I seek this opportunity because, I confess in advance, I am greatly disappointed in the results obtained by surgeons in various parts of the country. Patients come to me from widely scattered localities, having been operated on by surgeons of repute and of ability beyond question. Of course, it should be borne in mind that the cases thus seen are exceptional. If the experiences teach anything, the criticism applies to the method, rather than the operator.

REPORTS OF CASES

In illustration of this I shall cite three recent cases in young, healthy women.

CASE 1.—Mrs. B., aged 29, underwent instrumental delivery of a large child. An extensive laceration of the perineum, not involving the rectum, resulted. Six weeks after the delivery she was operated on by two of the leading surgeons of her city. On her admission to my hospital there was a marked cystocele, the cervix protruding through the vulva, with a pronounced rectocele. The posterior wall of the vagina had been cut away, leaving only a thin band of cicatricial tissue covering the rectum. The uterus was enlarged. There was a deep, double laceration of the cervix, with eversion.

A large, elliptical portion of the thickened anterior vaginal wall was excised and the anterior pelvic floor coapted by a line of deep, double buried tendon continuous sutures. The anterior vaginal wound was also closed by a single line of buried

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tendon sutures. The everted, lacerated cervical wounds were resected and closed with continuous tendon sutures. The perineal dissection was of course very difficult, but lateral flaps were secured by a deep dissection on either side, exposing the transversi, which were coapted and held in place by a double continuous buried suture. The posterior vaginal flaps were coapted by a single line of running buried sutures. An iodoform wool tampon in the vagina was the only dressing. The convalescence was easy and uneventful, and the restoration to the normal condition complete.

At the time of discharge from the hospital it would have been difficult to determine that the patient had ever been pregnant.

CASE 2.—The patient was a woman, aged 22. Conditions were so nearly like those in Case 1 that they do not require recapitulation.

CASE 3.—The patient was operated on a little more than a year ago by a leading surgeon in one of our Boston hospitals, and as in previous cases there was complete prolapse of the cervical portion of the uterus, with a marked cystocele and rectocele. Although in good general health the patient had been a great sufferer and a complete invalid for the entire year. Here also the posterior wall of the vagina had been dissected away, leaving very little covering to the rectum, but the pronounced feature was a constant purulent discharge from the vulva on both sides. This had been attributed to suppuration of the Bartholin glands. Much to my surprise the dissection revealed a long stay suture of silkworm gut, leaving a suppurating sinus throughout the entire tract where it had been buried.

These cases coming to me within a few weeks have impelled me to call the attention of the profession again to what I consider still a very common fault in technic. I must conclude that the basic principles of the operation are still in a measure misunderstood. A simple definition of the term "plastic repair" of any of the pelvic structures would be to restore them to their normal anatomic relationships. The time at my disposal permits only the briefest reference to the anatomy and function of these most important structures.

The transversi muscles, interdigitating and blending with the great levator group, with the associated fascia, are the recognized supports of the pelvic floor. Their

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central juxtaposition forms the much-discussed perineal body.

REPAIR OF PELVIC FLOOR

The reunion and restoration of these sundered structures is the object sought by the surgeon. To reunite them they must be anatomically exposed. They must be retained in juxtaposition in aseptic condition and reunion or restoration necessarily follows. As I have long insisted, the dissection should be made by a free separation of about the posterior third of the vagina, quite to the crest of the rectocele, and sufficiently wide laterally to expose freely the torn retracted structures. This means a wound that, to one first seeing it, would seem unnecessarily large, but unless the dissection is wide and complete it is very difficult, often impossible, to obtain free access to the important structures thus widely and for a long time separated.

So far as possible, I deprecate the invention of new instruments unless they may be devised to accomplish an important purpose.

In the separation of the vaginal muscle from the rectum the cicatricial structures are often difficult of dissection. The cutting edge of the knife I use is at an angle of 45 degrees with the line of the handle. When the parts are held tense with the fingers in the rectum, the use of this knife facilitates dissection, especially of the retracted cicatricial attachment of the transversi muscles. I consider the needle important and have found no reason to change it in any material respect, since it was presented to the profession by me twenty-five years ago. It is strong, of convenient length, set in a handle with a marked curve and a modified Hagedorn point. The eye is of some importance, since the slot on either side catches and holds the suture, preventing it from slipping.

Two fingers of the left hand retained in the rectum during the operation aid materially in suturing. After a little experience it is easy to coapt and hold in reten-

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tion the sundered structures with three or four strong double tendon continuous sutures. Light running sutures, best applied with the Hagedorn full curved needle easily coapt the less important structures, covering in the deep layer of sutures, while they themselves remain buried. If, for any reason it may seem desirable, it is perfectly easy to reform a hymen. The external wound is sealed with iodoform collodion, which, although it may loosen in two or three days, I consider a valuable protection from vaginal infection.

When the perineal rupture is complete, involving the sphincter and the bowel, the operation is almost as simple and easy. The vagina and rectal structures are carefully dissected. The rectum and sphincter are coapted, with a light line of double tendon sutures, the only care requisite being that they should be placed in aseptic structures. This slightly inverts the mucous membrane of the intestine. It is important to rejoin the sphincter fibers, as pointed out by Emmet many years ago. I sometimes use an independent suture of the sphincter muscle in order to secure a more firm coaptation. The posterior wall of the vagina is closed in a similar way, reducing the factors of the problem to those of an uncomplicated perineal laceration. The structures are sometimes so attenuated and the rectum so contracted that a successful operation requires patience, a careful dissection and a delicate technic but I do not now recall a single case in which I have not had a complete restoration anatomically, with complete restoration of function. In the rectum I use a large drainage-tube, with a cravat attachment of iodoform gauze, to be left for some days.

VESICOVAGINAL FISTULA

Almost every surgeon, even of to-day, is familiar with the monumental labors of my late great master, Marion Sims. The corner stone of his reputation was based on his cure of vesicovaginal fistula. As we review his

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operation from the standpoint of modern surgery and experience, we understand that his success was based on two factors. The first was his extraordinary skill in the careful dissection of the wound. I know of no operator to-day who excels, or perhaps, even equals the facile skill and dexterity attained by Sims. The second factor to which he attributed his crowning success was the use of silver wire sutures. These were applied with a skill which I have never seen equaled. Of course we now recognize that it was an aseptic suture, most difficult to apply and almost equally difficult to remove.

As I look back over the experience of those early years, I almost shudder over the worry and anxiety which I had in the imitation of the methods of this great man. I expected only to follow him afar off and never hoped to duplicate his great skill. As I now recall his experience, his first cure of vesicovaginal fistula was effected only after thirteen failures. Even to the end, his successes were the exception. The method which for a good many years I have employed first occurred to me after a considerable series of easy cures in cases in which I had closed wounds in the bladder from a variety of causes, from within the abdominal cavity. These were invariably simple in technic and perfect in result. A double continuous suture easily closed the wound with perfect coaptation, care being taken, of course, not to penetrate the mucous membrane of the bladder. Following this a retained catheter easily kept the bladder wall in a state of rest.

Profiting by this experience I made a wide dissection of the bladder from the vaginal wall and closed the bladder wound by a fine double tendon suture, which of course became buried. I then closed the vaginal wound as described in the operation for cystocele. The object of this extensive dissection was to obtain complete rest of the bladder wound during the process of repair, which is impossible when the vaginal attachment has been per-

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mitted to remain and the suture is taken through both the bladder and vaginal muscle.

Fortunately vesicovaginal fistula is far less common than formerly, and in the cases in which there has been a large destruction of the structures, the surgeon's skill and resources will be taxed to the utmost, but in every case of vesicovaginal fistula operated on as described I have had complete and seemingly easy cure.

HERNIA OF THE BLADDER

Hernia of the bladder, unfortunately, is often unrecognized and classed, in a general way, with cystocele. It is caused by the rupture of a portion of the strong fascia which goes to make up the pelvic floor. It may not be always easy to differentiate it from cystocele, and differs from it chiefly in that in the latter the whole anterior pelvic fascia is relaxed instead of presenting a more severe lesion of it.

Its cure is equally easy and satisfactory. As in cystocele, it is generally wise to remove a certain amount of the anterior vaginal wall. Then it becomes necessary to make the lateral dissection sufficiently free to expose the strong pelvic fascia and intra-fold it by a carefully applied, medium-sized double tendon suture. Indeed, the operation differs so little, except in the recognition of its anatomic cause, that the surgical procedures are not unlike those for the cure of cystocele.

HEMORRHOIDS

Viewed from the standpoint of discomfort and suffering, the marked changes often seen in the hemorrhoidal structures hardly belong to the province of so-called minor surgery.

I consider the most important contributions to the technic of hemorrhoidal operations are those of Mr. Whitehead, now recognized and described in all textbooks. My modification of the operation consists in a free dissection, exposing the outer rim of the sphincter

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muscle and suturing the hemorrhoidal plexus of vessels just within its borders. This line of sutures is covered and buried by a careful rejoining with the finest of sutures.

Suturing at the base, before division, occludes the vessels and prevents hemorrhage. The delicate anal structures, carefully coapted and retained in an aseptic condition, unite primarily without suppuration, and when the sphincter muscle has been paralyzed by careful dilatation, these tissues are easily kept at rest with very little suffering. Here, too, I usually seal with iodoform collodion since the protection of the structures by it for even a day or two is important. Of course the rectum has been carefully cleansed and the large tube with the cravat of iodoform gauze applied. The three factors necessary for success are the following: first, the making of a free, skilful anatomic dissection; second, a careful reuniting of the weakened injured structures by the use of buried absorbable sutures, preferably kangaroo tendon, and, third, the making and maintaining of an aseptic wound.

I recognize more fully than my readers the almost dictatorial brevity of the description of this treatment of the above group of pelvic lesions. Any one of them might properly demand a detailed description covering the space given to the entire group. Some might consider that I have given undue importance to the personal factor of individuality in the description, but I am sure that any good surgeon, after a little practice, can do these operations equally well, or better.

I have long since ceased to tabulate in a numerical way these operations, since little is gained by enumerating the multiplied experience of years.

A distinguished English surgeon sometime since was present at an operation and made pertinent inquiry as to the percentage of failures. I referred him to the matron of my hospital, who replied with something of surprise: "Not one, Doctor, since I have been here."

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"But how long have you been with Dr. Marcy?" She replied: "More than twenty years." This statement may not be strictly true, but it is essentially so, and the credit belongs, at least in equal share, to the faithful, devoted services of my enthusiastic nurses.

180 Commonwealth Avenue.

ABSTRACT OF DISCUSSION

DR. D. T. GILMAN, Columbus, O.: Dr. Marcy is probably the pioneer in the use of this absorbable suture and he is entitled to great credit for it. He gets results undoubtedly, but I cannot get the same results from an absorbable suture that he does. Dr. Marcy's method of introducing a couple of fingers into the rectum does not appeal to me. He has doubtless acquired an automatic asepsis from long practice that I would not have, and others would not have. I formerly used a knife for denudation, but I have practically abandoned it and have gone back to the scissors. If I have a good pair of scissors I do not need to have the fingers in the rectum; I simply put the tissues on the stretch.

DR. W. H. GILBERT, Evansville, Ind.: Dr. Marcy's technic, as we all know, is a technic unsurpassed. His results have the same uniform excellence. We all know that in the after treatment of perineorrhaphy it is extremely difficult to keep the region aseptic. I think the plan of sealing the parts with collodion is a most excellent one. Personally, I have ceased to use douches after perineorrhaphy. The technic I follow is absolutely dry. I use dry sponges, seal the parts with collodion and exercise the most rigid care in the after technic. Three times a day the perineum is thoroughly cleansed by bichlorid solution, and a bichlorid pack of dry gauze adjusted. I don't believe it is possible in the region of the perineum to secure absolute asepsis no matter how careful a technic is followed and no matter how carefully you wall off the perineum with towels, or how carefully the buried sutures are inserted. I have abandoned the routine use of buried catgut or kangaroo sutures in all parts of the perineum. I get the best results from non-absorbable sutures in the skin covering of the perineum and absorbable sutures in the muscles, fascia and vagina.

Eight weeks ago in a case of complete laceration there was operation immediately after delivery with non-union. Two weeks afterward a second operation was done by the same surgeon, which was a failure. The last operation was done by myself ten days ago. The line of laceration of the rectum was closed with catgut sutures with the knot on the inside of the perineum without any of the catgut being in the rectum. It is impossible to put absorbable sutures in the rec-

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tum and not have infection. Two deep sutures of silk-worm gut were inserted with the needle devised by Dr. Marcy. The one point necessary in the securing of good results is that alluded to by Dr. Marcy, viz., the excellent care given by the nurse, with rigid asepsis in the after treatment. We all achieve better results in the hospitals because of the aseptic technic more readily maintained. On the other hand, if the sutures are placed without proper care and regard for rigid asepsis and the wound not sealed with collodion it is almost impossible to escape infection of the perineum from purulent discharge from the uterus if it be infected. In many cases of old chronic endometritis complicating lacerations of the cervix and perineum, mixed cultures may be obtained at any time. It is very difficult here, especially when the cervix is torn at the same time, not to have more or less infection, but the end results are uniformly good.

Dr. C. Lester Hall, Kansas City, Mo.: I offer, with all due respect to Dr. Marcy, an improvement on the collodion dressing. I believe that if we will use instead an application of sub-iodid of bismuth, which with water makes a paste and a thorough protection of the parts, we will not have the infections so much dreaded. It is a preparation that can be easily applied and reapplied by the nurse after douching, is not readily removed by a douche and furnishes an impermeable dressing. It is not irritating, as collodion may be.

Dr. George Erety Shoemaker, Philadelphia: I want to express my appreciation of improvement in personal results since learning to use the buried continuous suture in perineal work and abandoning in nearly all cases the silkworm gut suture used for so many years. If the mucous membrane of the posterior wall of the vagina is preserved, none cut away, it forms an apron clear out to the edge of the wound. All discharges from the uterus and vagina are carried over and emptied outside, so to speak, lessening the chances of infection. Unlike Dr. Marcy, I prefer to keep all fingers clean for use in the wound. Carefully palpating the two edges of the recti, bring them together by continuous suture, then follow on down toward the surface, uniting the fascia and more superficial muscles that have been separated. Thus one gets perfect restoration and healing in practically every case. The patient has so much more comfort from not having to have the sutures removed afterward.

Dr. Frank A. Glasgow, St. Louis: I am surprised to hear the gentlemen speak of suppurations being so common, and also to have them decry the use of catgut. There has been much written about the repair of the perineum tending to confuse men and to make them think the operation far more difficult than it really is. Dr. Shoemaker anticipated what I wished to say, that he would preserve the posterior wall of the vagina. I do not think I have done a perineorrhaphy for

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twenty years in which I have removed the posterior wall of the vagina. It is an old operation, the same as Tait's, and one which I inherited from men before him, in which we simply raise up the posterior wall, extending the denudation up on either side of the vagina, up to the crest of the rectocele and then uniting the lateral parts. Under this procedure suppuration is the rarest thing in the world. There is no necessity for it, and I use chromicized catgut. Formerly I used the mattress sutures through from one side of the vagina and back again. Then when Tait taught us how to bury catgut I used that method and do not have suppuration. If a stream of water is used over the denudation down over the perineum carrying anything which should escape from the rectum downward suppuration will not occur and buried catgut may be used. There is no easier operation in gynecology than just this repair of the perineum, and every practitioner ought to be able to do it. Many men do not make a perineum. They simply denude a little and bring the skin together. You should raise up the posterior wall, extend the denudation high up into the vagina and on either side and bring the lateral walls together by buried sutures. You will thus have a good perineum and no suppuration.

Dr. H. O. Marcy, Boston: A man works best with the instruments with which he is most familiar. The two fingers in the rectum help not only in the use of the knife but in the application of the suture, making a double shoemaker's stitch. When one becomes a little used to the method one will not mind the loss of those two fingers for other purposes. I am glad to have the value of the nursing emphasized. It is a large factor after we are through with our surgical work.

The late Dr. Jenks of Detroit was the first, so far as I know, to preserve the posterior vaginal mucous membrane as he called it. I was the student of Sims and Emmet, and delighted to try to imitate the dexterity with which they used the scissors. I have seen continuous backward and forward dissection with a pair of scissors as a girl would pare an apple without the infraction of the entire process. But I found that Dr. Jenks was not removing the mucous membrane but dissecting the posterior vaginal wall. That is very thin in most instances. Near the original lesion of the parts it breaks easily. That is why I like the knife. With scissors we are apt to cut buttonholes. It is important that one make a dissection of the posterior wall of the vagina and leave it intact. It is also important that one make use of modern aseptic methods. There must be a clean vagina, a clean uterus. In most instances one curettes, sews up the laceration of the cervix and then applies the iodoform dressing in the vagina. What I like best is to use it on a wool tampon. After this is completed it is an easy matter to seal the wound with collodion, and it remains for two or three

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days. The vagina is literally packed with iodoform wool and that is left alone for three or four days. That is the end generally of all the treatment. The rectum is almost always packed in the same way.

No one has referred to operation for complete laceration of the anterior or posterior vaginal wall. In the old days we were all greatly troubled by vesico-vaginal fistulas. My old master, Sims, taught me the use of silver wire, and we all had great agony over it. When I operated within the abdominal cavity for bladder injury I found that I obtained recovery without difficulty. Then it occurred to me that the reason we failed in vesico-vaginal fistula was that we had a cross-pull of the complex structures. Therefore, I separated the attachment of the vagina to the bladder, freshened the wound and then closed the bladder wall with a double continuous fine tendon suture, not unduly compressing the tissues. That, of course, is buried because the vaginal wall is closed over it, and in every single instance I have had just as easy recovery as I did when operating from within the abdominal cavity. If I could say nothing else, I should like to emphasize this point, that I believe this to be a very great advantage in my technic. It is comparatively immaterial how one applies the sutures. With coaptation, retention, and aseptic rest, good results will follow. With wounds treated in this way in my own hospital in several thousand cases there have been not 2 per cent. of failures in the last fifteen years.

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TUBERCULOSIS OF THE FEMALE ORGANS OF GENERATION AND THE PERITONEUM

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HISTORICAL SUMMARY

The study of tuberculosis of the female genitalia was secondary to that of tuberculosis of the peritoneum, although Morgagni, in making a necropsy in 1744 on a young woman who had died from tuberculous peritonitis, found the uterus and Fallopian tubes filled with caseous material and considered these organs as being the primary focus of the disease. Similar conclusions were reported by others who had found similar conditions. At this time, however, tuberculosis of the female genitalia was found only in patients suffering from a constitutional invasion. The local condition was discovered only at autopsy and had no clinical interest; it was considered simply as a pathologic curiosity. This antedated the year 1825.

Christian Fenger divided the history of our knowledge of this disease into three periods. The first embraces everything antedating 1825, which I have described. The second includes the period from 1825 to 1884; during this period peritoneal tuberculosis became better known and more frequently recognized. It was thought at that time that simple peritonitis terminated in recovery; that is, in certain recognized cases of peritonitis the patients did recover, and this fact led to the conclu-

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sion that they must be simple, while tuberculous peritonitis was thought to be always fatal. The third stage from 1884 to the present time began when Koenig proposed laparotomy as a cure for tuberculous peritonitis. It is interesting to note that Koenig reached this attitude of mind from *a priori* deductive reasoning. He had had extensive experience in successfully opening and draining knee-joints and other articulations for tuberculosis. These joints are, as we know, closed cavities lined by a serous membrane; reasoning by analogy, therefore, he concluded that, if incision and drainage cures tuberculosis of a serous membrane in a joint, it should be equally as effective in the abdomen. Acting on this conclusion he submitted four patients suffering from tuberculous peritonitis to operation, and published a paper describing the procedure, in which he reported three recoveries and one death. In 1889 he presented a second paper in which he reported 131 similar operations collected from literature and his own clinic. The results showed 107 in satisfactory condition on leaving the hospital. Of these 107, seventy-four were cured and thirty-three improved. This was the beginning of the new era in the study of this disease, and to Koenig the modern world is indebted for an entirely new concept in its treatment. Many operators in various parts of the world followed in his footsteps and thus an experience was gained that changed materially the prognosis. It was learned that cures occur sometimes spontaneously; especially is this the case with children. In the crusade for eradication of the scourge of tuberculosis the search light is being turned on every phase of the disease, and vigorous means of stamping it out are being applied wherever its head appears.

PRIMARY FOCUS OF TUBERCULOSIS

The possibility of tuberculosis of the genitalia being a primary focus is a question of which most diverse views are entertained. Some of the most careful investigators

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positively deny it, while others as positively assert that it is possible, although all admit that it is very rare. The readiness with which women of the present day are submitting to gynecologic examinations, and the careful discriminating diagnostic acumen that is being directed to this line of research have brought to light cases in which the only lesion to be found in certain cases has been confined to the cervix, the vagina, or the uterus. The order of frequency with which the generative organs proper are involved is as follows: Fallopian tubes, uterus, ovaries, vagina, vulva.

Genital tuberculosis may be either primary or secondary. By the former it is generally understood that the focus in the genital organs is the primary seat of invading infection. Of necessity an ascending infection is generally primary, and a descending is secondary. According to Hegar the primary ascending infection is produced by penetration of germs from the outside directly to the mucosa of the vagina, uterus, tubes, and finally the peritoneum and ovaries; and the secondary, by penetration of germs into lymphatics through minute breaks in the continuity of the tissue of the genital canal, the germs being so carried to the Fallopian tubes directly or by way of the pelvic peritoneum into the tubes at the fimbriæ.

The source of the infection may be the seminal discharge of tuberculous men during intercourse. This has been strongly advocated by some investigators and seems *a priori* to be quite reasonable. But so many cases of tuberculosis of the epididymis with tubercle bacilli in the urine and seminal discharge in married men are known without the wife becoming infected that the chances seem to be against this theory. Even granting that this might be the source it would require unusually favorable conditions for its success. The preparation of the soil for the implantation of the infection by gonorrhea becomes a prerequisite. The puerperal state with

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its attendant traumatism offers favorable soil for primary infection. Martin has noted the fact that there is frequent coincidences between tubal pregnancy and tubal tuberculosis indicating a previous lesion.

Dührssen has had a case, mentioned by Amann, in which catheterization of the uterus to overcome sterility was followed by acute tuberculosis of the tube and peritoneum; whether infection was carried in by the catheter or whether the operative interference was simply the occasion for the acute outburst is a question.

It is possible that the street dust loaded with tubercle bacilli and swept up by a woman's skirts and thus deposited on the external genitals may be a source of infection.

TUBERCULOSIS OF THE PERITONEUM

Method of Invasion.—Tuberculous invasion of the tubes and ovaries may precede that of the general peritoneum, be contemporaneous with it or follow it. They are frequently found existing together and probably have the same origin. In tuberculous peritonitis, the disease reaches the peritoneum by three channels: first, hemic, through the blood-current, which gives rise to the acute miliary form of general tuberculosis; second, by contiguity; which form is secondary to tuberculosis of the lymphatic system, or to ulcers of the bowel which have not yet perforated the peritoneal coat; third, by continuity, which form arises from extension of ulceration in the bowels or Fallopian tubes. This is spread over the peritoneum by lymph-currents or, as some assert, by gravity along the serous surface. The direct primary hemic method is believed to be extremely rare.

Treatment.—There is practically a unanimity of opinion among all who are experienced in handling this disease, that, if possible and practicable, the focus of infection should be removed. On this point William J. Mayo says: "The treatment of tuberculous peritonitis

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should embrace not only the treatment of the peritonitis, which is symptomatic, but the removal of the source of infection, which in the majority of cases will be found in the Fallopian tubes, appendix or intestine." Murphy says: "The surgical treatment of tuberculosis of the peritoneum involves the following propositions: (1) to remove or shut off the source of supply to the peritoneum of new tuberculous debris; (2) to remove the products of the infective process from the peritoneum; (3) to increase the tissue proliferation for the encapsulation of the foci already present; and (4) to avoid mixed infection."

It is therefore desirable, to say the least, that a diagnosis of the presence of tuberculosis be made in advance of operation. The investigation should embrace a careful examination of the genital organs by touch, so as to determine their exact condition. The fact that this malady is frequently discovered in young girls should be kept in mind. The history of the case with relation to heredity, loss of appetite and weight, and the possibility of venereal infection, should be carefully considered. Martin recommends the application of Koch's tuberculin injection test. He also lays great stress on the subconjunctival instillation of Pirquet-Calmette. He considers this especially important in cases of tuberculosis complicating pregnancy, for the reason that the reaction determines the amount of resistance being offered by the patient, and thereby indicates the wisdom of allowing pregnancy to continue.

But when all these precautions have been taken into consideration, surprise may await the surgeon, on opening the peritoneal cavity. Allport has voiced this in his forceful and characteristic style when he says: "Uncertainty is the characteristic element in the preliminary diagnosis of all tuberculous infection of the peritoneum; surprise inevitably awaits the surgeon as he opens the abdomen; and the unexpected sits ever at the elbow of

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the pathologist as he examines the specimen in the laboratory."

Operation.—In dealing with any individual patient the method of procedure must be adapted to the condition presented and so may vary with every case. Experience has evolved some pretty definite and fixed rules. First, it must be constantly kept in mind that spontaneous recovery is often possible; at the same time, it must not be forgotten that Nature in her effort to overcome the disease can be greatly assisted in many cases by the surgeon. When the operator has made the abdominal incision and recognizes that he is in the presence of a more or less extensive tuberculous peritonitis, even with distinct foci in the uterine appendages, what shall be his rule of procedure? He should not be led astray by the protean forms of the disease that reveal themselves in successive cases. The whole situation becomes clear when he recalls the fact that there is but one basic lesion of which the case in hand is one of its stages. Nature is ever waging her war of resistance. Her line of defense may be overwhelmed in the first onset and a condition of hopeless route and annihilation may be presented. This condition obtains in cases of ulceration, perforation, cheesy degeneration, and mixed infection, with resulting hectic fever. On the other hand, we may have a picture of disseminated miliary tubercles accompanied by abundant ascites; this exudate is indicative of a protective process due to irritation of the unaffected peritoneum. If in this process the individual has gained advantage in the fight, this irritation becomes an obliterative peritonitis, the final process resulting in fibrous or cobweb adhesions. Another picture is presented when the infection has invaded the peritoneum from contiguous organs, and presents an ulcerative or cheesy form which is accompanied by fibrous nodules, cicatrizing ulcers, masses of plastic exudate possibly here and there organized into obstructing bands of fibrous tissue. Ad-

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hesions and obstructing bands may form sacculated receptacles containing tuberculous debris known as pseudocysts, which may contain pus; this indicates mixed infection, possibly a colon bacillus. The omentum may also be matted together, being an extension of the same process.

As has been said, positive diagnosis is difficult and uncertain, hence the surgeon must be ready to deal wisely with the condition found. In the practical handling of these cases they may be divided into three classes, first, the ascitis; second, the adhesive; and third, the cheesy, attended usually with debris and pus.

In the first or ascitic variety the serum should be evacuated and the wound closed without drainage. These are the cases that recover so mysteriously and so permanently. As a sequel to this surgical intervention, the patient should receive the benefit to the fullest extent of such theraputic measures as climate, hygiene and diet. These are usually cases of general miliary peritonitis. If a definite focus is discovered in the tubes or the appendix, its removal is desirable. But quiescent adnexa which have been long buried in protecting adhesions should not be disturbed.

In the second class, or adhesive variety, if the plastic exudate is quite universal, and a tendency to organize into adhesive bands is apparent, no interference should be attempted unless a distinct focus can be easily reached and removed. The wisdom of attacking this for its removal will depend on the general condition of the patient. The wound should be closed without drainage.

In the third class of cheesy deposit, with collections of debris, some operators, acting on Koenig's suggestion of the analogy between articular joints and the peritoneal cavity, have advocated curetting, excision, sature, and dissection of the tuberculous masses. This is too radical surgery. Experience has shown that it is disastrous. Adhesions that presumably shut in intestinal ulceration

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should be carefully preserved, but collections of debris and pus should be as carefully cleansed and the cavity drained with cigarette drains of gutta-percha tissue. Gauze drains should be proscribed. Allport says: "Gauze drainage is a snare of the devil and is especially apt to be followed by serious and often fatal fecal fistula in the dry forms of tuberculous peritonitis. Statistics show conclusively that its practice leads to evils which are worse than the original disease."

Parker Syms in summing up an article read before the New York Surgical Society, March 13, 1907, says:

We have learned that operations should not be undertaken during the first year of infancy; we have learned that surgery offers but little hope in the adhesive variety of the disease; we have learned that the serous variety offers the best prognosis under the various forms of treatment and that the surgical treatment of this variety offers the best results obtainable in this disease. But the most important lesson we have learned is that the scientific operation of today is the one which has for its foundation the removal of the original focus of the disease, as the tuberculous Fallopian tubes, vermiform appendix, mesenteric gland, etc.

CASE REPORTS

My experience embraces seven cases widely distributed through my years of practice.

CASE 1.—Miss R. T., aged 32, referred to me as a subject of chronic general peritonitis, May, 1887. Without any suspicion of tuberculosis I opened the abdominal cavity for the purpose of drainage, and with the expectation of finding pus foci in the Fallopian tubes. The entire peritoneum was covered with a moist grayish exudate agglutinating universally the omentum and the coils of intestine. Never had I seen such a case before. There was almost no literature on this subject at that time, and in my ignorance I separated the adhesions and drained freely in all directions with gauze. The result, of course, was a prompt fatality.

CASE 2.—Mrs. S. M., at the New York City Hospital, came into my service May, 1894, as a case of double adnexal disease, the adhesions filling the entire pelvis. The patient's general condition was bad, with a daily temperature of 101 F.

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I performed a vaginal pan-hysterectomy. On examining the specimen during its removal miliary tubercles were apparent on the peritoneum surface of tube; the uterus and ovaries were cheesy. As the patient was in no condition to withstand a laparotomy, I elevated the patient in the Trendelenburg posture, and with retractors opened wide the vaginal opening into the peritoneal cavity, after which the pelvis was drained vaginally with iodoform gauze. The patient died in less than a year.

CASE 3.—Mrs. G. L., City Hospital, June, 1894, had symptoms of almost constant pain in the left ovarian region; diagnosis, salpingitis. On opening the abdominal cavity I found a condition of general miliary tuberculosis. The left tube and ovary were bound together by adhesions, the tube being large and covered with tubercles. There were no other adhesions, and no ascites. The left adnexa were removed, the patient was wheeled into the sunlight and the direct rays of the sun were allowed to pour into peritoneal cavity through the widely opened incision. The wound was closed without drainage. The patient made a complete and permanent recovery.

CASE 4.—Captain —— of the Salvation Army, presented herself at my office December, 1908, giving a history of constant pain in the right ovarian region, which had grown steadily worse for about a year, with the pain intensified at menstrual periods. There was loss of strength and flesh. The abdomen was distended and tympanitic, with dullness in the flanks. A hard nodular mass filled the right pelvis, crowding the uterus to the left side. I made a diagnosis of probable tuberculosis, and subjected the patient to a laparotomy at the Woman's Hospital, January, 1909. On opening the abdominal cavity I found coils of intestine firmly agglutinated together and firmly attached to the right adnexa, forming a large mass. The surrounding peritoneum and the fundus of the uterus, where the right horn could be seen peeping out of the coils of intestine, were dotted with miliary tubercles. In attempting to separate the intestines, I found that their walls were thoroughly invaded and quickly felt that the part of wisdom was to desist from further interference. I therefore sponged the cavity dry and closed the wound without drainage. Temperature ran daily to 101½ F. for about a week. Under careful and enforced diet, strength returned rapidly, and the patient left the hospital in four weeks. Outdoor life, day and night, and good nourishment were enjoined, and one year later she reported at my office greatly improved and ready to go back

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to the ranks of the Salvation Army. There was no ascites and the pelvic mass had diminished to at least one-half of its former proportions. I have not seen the patient since.

CASE 5.—Miss E. D. M., aged 22½ years, was a private patient of Dr. Weiss, Mt. Vernon, N. Y., who has kindly furnished me the following history:

"I first saw the patient on Dec. 1, 1906, and found her suffering with an attack of acute lobular pneumonia (lower left lobe), with no cough but felt oppression in chest, had high temperature and felt sick.

"The history leading up to this acute condition in brief was this: The patient had been more or less tired for some five or six weeks, but still went to work, when she was suddenly taken down on or about December 1 with a chill and the acute condition above spoken of. The pneumonia took the usual course and on Jan. 24, 1907, some seven weeks after the beginning of the original illness the patient returned to work. At this time the pneumonia had resolved and, while her general condition was fair, she was still weak. The patient continued to go to her work (that of a stenographer), from Jan. 24, 1907, to Feb. 28, 1907, about five weeks, when she again noticed that she had severe pain in the left lower abdomen. She persisted in going to work, however, until February 28, when the pain became so great that she remained at home. Examination at this time showed nothing special in the thorax. There was a general swelling and distention of the abdomen. Percussion of the flanks showed some slight evidence of liquid in the abdominal cavity. There was thickening of left Fallopian tube with considerable pain on pressure; otherwise the patient's condition was negative.

"The usual hygienic and tonic treatment was instituted, the tentative diagnosis being tuberculous peritonitis. On March 18, 1907, Dr. Goffe kindly saw the patient with me and gave his opinion that an absolute diagnosis was difficult to make and advised close observation.

"Four days later patient was transferred to the Mount Vernon Hospital. The distention at this time had improved somewhat, the pain, however, in the lower left side persisted, and there was more or less fever with increased pulse-rate.

"During the following two weeks patient appeared to improve. In consideration of this fact, on consultation with Dr. Goffe, it was decided to do an exploratory laparotomy. Accordingly on April 3, 1907, under the direction of Dr. Goffe, I opened the abdomen and found the peritoneum studded with many patches, congested, and all the organs adherent. The

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parietal peritoneum itself was fully ⅜ of an inch thick. The left tube was found considerably enlarged and adherent. It was decided to close the abdomen without drainage and institute a sustaining and tonic line of treatment. After a few days the abdominal wound broke down and large quantities of pus came from the sinus.

"During the summer of 1907, the patient had chills with continued rises of temperature, sweats, lost considerable weight, and drained a great deal of pus. Examination showed some of these sinuses extending from 5 to 6 inches under the abdominal wall, one in particular, running up from the wound on the right side toward the liver.

"From April until October the fresh-air and hygienic treatment in every sense of the word was carried out to the letter; not only were the windows of the patient's sleeping apartment kept open day and night, but she was carried daily down to the lawn, where she passed her time either on a couch or in a hammock, thus enjoying the benefit of the outdoor treatment continuously. In addition to this she was given tonics and proper food.

"About August 1, 1907, the heretofore weak and bed-ridden patient began to show perceptible signs of improvement and, while her weight at that time could not very well be taken, her general appearance, in spite of the large amount of drainage from the wound, showed considerable weekly improvement. This went on continuously until in September the patient was permitted to walk about and take exercise. The improvement continued along these lines until October 6, when in addition to the pus drainage there were evidences of a fecal fistula.

"From October, 1907, until April, 1908, in spite of the inclement winter weather, the same open-air treatment was continued. By April 1, 1908, the patient had improved to such a degree that it was decided to transfer the patient to her own home. On the day of transfer (April 6), the patient's weight was found to be 102 pounds, as compared with 104 or 105 pounds, which was her best previous weight in health.

"From April 1 until August 1, 1908, she remained at home continuing in about the same general condition, with an occasional chill and a small break-down possibly of some gland or pus pocket as shown in the increase of drainage, improving, however, in general condition.

"She was permitted to take up some of her previous business duties. Accordingly, she accepted a position which permitted her four to six hours light work, with the coincident exercise of walking daily back and forth to her place of business.

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This test she stood remarkably well and, with the exception of one or two minor colds during the winter, improved to such an extent that on April 6, 1909, she appeared sufficiently recovered to be able to take up her more arduous duties as chief stenographer in a large law office in a town about ten miles away. This, of course, included not only walking to the station, but twenty miles' railroad travel as well. She stood the strain of this new occupation very well until midsummer when she began to lose in weight. She then took a three weeks' vacation in the Adirondacks and returned to work in August considerably improved.

"From that time, August, 1909, to the time of the present writing, March, 1910, she has enjoyed very good average health, with the exception of an occasional attack of bronchitis, generally the result of some indiscretion in dress. She looks well, eats well, and is able to carry out all the duties of her position and, while she tires from time to time, it cannot be said that she does so to any greater extent than any other person might under similar circumstances.

"During this time, namely, from about July, 1907, to March, 1910, an effort has been made at all times to carry out the open-air treatment, and particular attention has been paid to regular meals, largely of the proteid type, with very little medication. An occasional tonic or emulsion or a little ordinary cough medicine has been about all the medical remedies employed. No alcohol has been used. The patient has been advised to rest as much as possible and also to get as much sleep as circumstances will allow.

"The patient now looks well, has a good color, is strong and eats and sleeps well. She weighs at time of writing 103 pounds. There remains a small fistula which discharges some pus daily and occasionally some fecal matter, showing that the fecal fistula is not entirely healed. The only trouble the patient now experiences is that, when the sinus closes, the fecal matter seems to accumulate between the intestines and the abdominal wall and, until relieved, there is more or less pain and distress. Other than that the patient has no discomfort.

"In February, 1907, just subsequent to the attack of pneumonia, when the patient again went to bed, she menstruated continuously for about three weeks before being removed to this hospital. From about March 22, 1907, to Jan. 4, 1908 (a period of ten months), menstruation ceased entirely. On Jan. 4, 1908, it recommenced and has remained regular ever since in time, quantity and quality.

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"A recent internal examination showed no especially abnormal conditions, except that the uterine organs and adnexa are fixed and there is some thickening and fulness in the left broad ligament and tube.

"Examination of pus made by our pathologist, Dr. Goldhorn, showed nothing of interest.

"My interpretation of the general low-grade peritonitis which commenced in March, 1907, is that the infection was due to the pneumococcus germ secondary to the original attack of pneumonia.

"In closing a word might be said in regard to the treatment. It will be noticed that after the original laparotomy it has been entirely medical and that there has been no surgical interference. This has been done advisedly, for the reason that the patient showed continuous improvement, and the condition and the internal conditions, so far as they could be interpreted from the laparotomy and subsequent course of the disease, were such that any surgical procedure would be fraught with so much danger that the inconvenience of a small fecal fistula was considered preferable to a possible unfortunate outcome, the result of a surgical interference."

CASE 6.—Mrs. S. R. H., aged 26, had been married five years, had never been pregnant and had always been a great sufferer from dysmenorrhea. Four years ago the patient had an attack of pleurisy, being in bed ten days. During the following two years she complained of painful breathing and a stitch in the side. She lost flesh and became very weak. For the past two years she has suffered pain in both ovarian regions, at intervals so intense that morphin had to be used. Dec. 25, 1909, the patient entered Lawrence Hospital, Bronxville, N. Y., where I operated for salpingo-oophoritis. The adnexa of each side were bound together with plastic exudate and the tubes, as well as the neighboring coils of intestines, were freckled with miliary tubercles. The adnexa were removed with the exception of the left ovary which was apparently free from disease. There was no ascites. Recovery was prompt. Three months later, April 11, the patient reported a gain of 5½ pounds; she was never so fat in her life. She can walk now without pain, but tires easily, is living out of doors and sleeping on the veranda.

CASE 7.—Mrs. E. D., aged 44, was subjected to laparotomy for constant pain in the abdomen, which was accounted for by adhesions. There was also an old hardened chronic condition of the left adnexa. The omentum was attached to the sigmoid flexure and the fundus uteri. These adhesions were separated

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and part of the omentum removed, as was also the ovary and tube of the left side, which were bound firmly together. There was no evidence of tuberculosis present, but the pathologist reported that the walls of the tube were pretty generally invaded with tubercles. The patient made a prompt recovery and has been relieved of her pain. This case undoubtedly stands as an example of spontaneous recovery.

616 Madison Avenue.

ABSTRACT OF DISCUSSION

DR. EMIL NOVAK, Baltimore: The possibility of tuberculous peritonitis should always be borne in mind in any obscure abdominal condition, especially in the presence of an abdominal tumor. An illustrative case is that of a colored woman whom I saw about four years ago. She was brought into the hospital several weeks after delivery. Her only complaint was that the abdomen was just as large after delivery as before. After examination, we decided that there was probably an ovarian cyst complicating pregnancy. Not until the patient had been anesthetized and placed on the operating-table did we notice a deep-seated mass high up in the abdomen, which made us think that the condition was not one of ovarian cyst, but possibly one of tuberculous peritonitis. At operation, we found the woman suffering from tuberculous peritonitis with an encysted ascites, while the deep-seated mass proved to be a much infiltrated great omentum. The case was particularly interesting, in view of the fact that the presence of one abdominal tumor, the encysted ascites, had misled us, and that the other tumor, the infiltrated omentum, had put us back on the right track.

In estimating the good results following operative treatment in this disease, one must bear in mind that there is a strong tendency in many cases toward spontaneous recovery. This is well illustrated in a case reported by Louis, of a young man suffering with very advanced tuberculous peritonitis, with marked ascites, emaciation, etc. In this condition he fell a victim to Asiatic cholera, and recovered not only from the cholera, but also from the tuberculous peritonitis.

DR. C. C. FREDERICK, Buffalo: Patients with acute tuberculous peritonitis sometimes do not survive the shock of operation. With the exception of that one source of fatality following operation, I have never seen a patient die as a result of operation nor fail to see a patient apparently completely recover. I have seen many who have passed through the same course as that given by Dr. Goffe in the history of his patient. I have seen them go for a period of from six months to a year or a year and a half or two years with a stormy career, but eventually recover. I have never seen

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one left with a permanent fecal fistula or any other fistula, although the infection of the abdominal scar as the result of contact of the tuberculous infection with the wound at the time of operation is sometimes a source of trouble for several weeks or months after the operation. Four or five years ago, I began using drainage through Douglas' pouch in these cases almost as a routine procedure. I broke up all the adhesions in the adhesive cases in which the intestines had been lifted into the upper part of the abdomen by the accumulations of fluid beneath them and the peritoneum, all the mesentery having become adherent, so that one could see simply a mass composed of intestine in such condition that one could not see a convolution of the intestine. I free the adhesions completely, sometimes the operation being 30 or 45 minutes in duration. All the tuberculous surface is exposed to view and to contact. The abdominal cavity is sponged out. In women usually the focus of infection is the tube. Then a drain is passed down through Douglas' pouch. I always put in a big drainage tube with fenestræ at the top. The tube is kept in for weeks so as to insure free drainage from the lower part of the pelvic cavity even after the upper part may be shut off by adhesive inflammation and lymph. Such treatment is almost invariably followed by recovery in cases of tuberculous peritonitis.

Dr. Robert T. Gillmore, Chicago: Recently, I have been unfortunate enough to have three cases of tuberculous peritonitis or salpingitis. The symptoms are much the same as those of tuberculosis in other parts of the body, though not quite typical as regards the evening rise of temperature and the night sweats. In some cases the condition comes on insidiously with slight pain if the disease originates in a tube, and it may not be greater on the side on which operation shows the greater pathologic condition. The pain is dull and there is usually some tympanitis. Besides those symptoms I have been able to get nothing characteristic. The temperature may be normal; the pulse rapid. A diagnostic point which should not be neglected is the von Pirquet reaction. This is not a positive reaction, and in adults is of negative value. If old tuberculin is used and the reaction does not occur it may be assumed that the condition is not tuberculous. Another diagnostic point is leukopenia instead of leukocytosis, which occurs with any of the pus-producing organisms. One of my patients had been treated for three months for typhoid fever; owing to similarity of the clinical picture the diagnosis was not inexcusable, but had the indefinite bilateral pelvic mass been palpated the diagnosis would have been easier. Still another point is the finding of fluid in the abdomen.

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Sometimes there is postural accumulation of fluid, such as is seen in non-compensated cardiac conditions or in lesions of the kidneys. If disease of these two organs can be eliminated tuberculous peritonitis may be suspected.

DR. A. MILES TAYLOR, San Francisco: I have been working along these lines for some years, and I agree with Dr. Goffe that it is very difficult without a thorough knowledge of pathologic conditions to make a correct diagnosis. However, with the means we now possess in the laboratory, and with long experience, we should be able to overcome this. I am much interested in the case of tuberculous tube with ectopic gestation, this being the only case reported so far, other than those which I reported in a monograph written ten years ago, and in a paper which I read on May 10, 1910, before the San Francisco County Medical Society, entitled "Tuberculosis of the Fallopian Tubes as an Etiologic Factor in Extra-Uterine Pregnancy," wherein I reported 64 patients operated on, and 42 of whom were proved, by pathologic laboratory examination, to have tuberculous tubes. I believe that the primary infection may be, and is, introduced through the vagina, either by examination with finger, by coitus, or through abrasions of the vulva. In the secondary form it is introduced by foci in some other organ of the body, as the lung, hip, or knee joint, or any other organ infected with this disease. The monthly congestion of these organs certainly is a field inviting to the tubercle bacilli, as well as to any other pus-forming microorganism. Many surgeons have reported tuberculous disease of the tubes even in girls of 17 and upward. Such men as Kaufmann, Amann, Kleinhans, Tuffier, Pozzi, Delbet, Hartman, Faure, Sick, Bier, Murphy, Ochsner, Tuholske, Riolanus, Vassall and Regnier de Graf have reported this condition, but none of these gentlemen has associated tuberculosis of the tube as a cause of ectopic gestation previous to this time.

DR. H. T. BYFORD, Chicago: When we separate extensive adhesions in cases with but little effusion we often get ulceration and breaking down of the intestinal walls. Hence, I think, it will not do to recommend the separation of adhesions in all cases. In view of the fact that many recover without operation, we should look at the matter from a conservative standpoint. These adhesions are Nature's method of limiting the disease, and, usually, form again. You cannot drain any part of the peritoneal cavity longer than a day or two. As a rule I drain only long enough to let out the excess of material which Nature has not been able to take care of. In most cases it is enough to let out the fluid and remove the septic focus, and, if desired, let in a little air or sprinkle in a little iodoform as a local stimulant. Although the ovaries and

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tubes may not be the primary focus, they usually require removal in cases of pelvic tuberculosis, because the monthly congestion seems to favor the development of germs.

DR. TOD GILLIAM, Columbus, O.: I presume that most of us are influenced by our own experience in these affairs. A few years ago, Dr. Byford and I were pitted against each other in Chicago on this same subject. I am a strong advocate of operative interference in tuberculous peritonitis with effusion. I am an advocate principally from my own experience, which has been most favorable, and because one gets immediate and convincing results. When the abdomen is opened and the fluid let out, usually that is the end of the trouble. I have sometimes had reaccumulation, but even this would disappear and almost every patient with uncomplicated tuberculous effusion has been cured. I never interfere with the adhesions of tuberculous peritonitis if I can help it, and I am very particular not to do any damage to the intestines. I have never known an intestinal tuberculous fistula to heal, and I dread them greatly. If I find that the tubes are involved, and I can get them out without damage to the intestines, I remove them. In cases of this class I have had excellent results.

DR. J. R. GOFFE, New York: I believe in the conservative method of treating these patients as I indicate in my paper. In one of the cases reported, the young woman had been suffering from one to two years and was finally obliged to give up her work in the Salvation Army. I made a diagnosis of tuberculous peritonitis, with the focus probably in the right appendages, and did a laparotomy. There was considerable serum, which I carefully sponged out. In attempting to separate the adhesions about the diseased appendages on the right side, I found that the walls of the intestine were involved, and, after separating just a few "of the uppermost coils of intestine," I desisted and restored them to their original position and closed the abdomen without drainage. She made a beautiful recovery, the most satisfactory convalescence I have ever witnessed. I take the stand that in all these cases conservative work is the best. Remove the focus, if easily and safely reached, but refrain from all serious damage to the tissues, drain out the fluid and close the wound.

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ARTERIOSCLEROSIS OF THE UTERINE VESSELS

WITH A CONSIDERATION OF THE CAUSE OF HEMORRHAGE AND REPORT OF CASES

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In the history of this condition we find a cycle such as is common in many medical subjects. At first only the changes in the uterine muscle and blood-vessels were considered. After Olshausen's introduction of the curette attention was centered on the endometrium. All irregular bleeding was attributed to changes in this structure, and an almost infinite number of classifications and varieties of endometritis resulted. The work of Adler and Hitschmann[1] which was later verified by Norris and Keene[2] has shown that much of that which was formerly considered pathologic in the endometrium is simply the normal change that occurs in the menstrual cycle.

But long before this work on the endometrium was done, attention began to be directed again to the changes in the blood-vessels and uterine muscle. I shall not attempt to review all the literature on this subject but shall refer to only a few of the more important articles. Findley[3] in 1901 was one of the first in America to write on this subject, notwithstanding operators had been removing the uterus for this condition for several

1. Adler and Hitschmann: Monatschr, f. Geburtsh, u. Gynäk., xxvii, part 1.
2. Norris and Keene: Surg., Gynec. and Obst., x, No. 1, p. 44.
3. Findley, Palmer: Am. Jour. Obst., xliii, 80.

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years before. The case he reports was one of the so-called "apoplexia uteri" due to an embolism of the uterine arteries, which was probably cardiac in origin. In his later paper[4] he attributes the hemorrhage to a muscular insufficiency, and this in turn to an overgrowth of the fibrous tissue, both between the muscle bundles and about the arteries. With these conclusions I do most heartily agree concerning the value of the uterine muscle in the control of hemorrhage. Anspach[5] demonstrated that the increased connective tissue in and about the arteries was very largely elastic rather than fibrous tissue. He suggested that, as this elastic tissue was so commonly found in the uteri of multiparæ its presence was physiologic rather than pathologic and that the hemorrhage in these cases was due to a lack rather than an excess of elastic tissue.

Goodall[6] has made another and very decided advance in our knowledge of these cases. He has shown that the uterus after each pregnancy develops a complete new set of arteries; that where the difference in size between the old artery and the new one is great as in the placental area, a complete new vessel with three complete new coats is formed within the lumen of the old one; but where the difference in size is less marked, part of the old vessel is retained and is incorporated as a part of the wall of the new vessel. Normally the unutilized portions of the walls of the old vessels undergo hyaline degeneration and are completely absorbed. This is the ideal involution. But when some local disturbance or constitutional condition complicates the puerperium, the change is less perfect and the muscularis of the old vessel after the hyaline degeneration has taken place is replaced by elastic tissue instead of muscle. This is in accordance with Nature's law to do the best thing possible under the conditions present. Where the disturbing

4. Findley, Palmer: Am. Jour. Obst., lii, 71.
5. Anspach: Univ. Penn. Med. Bull., xviii, No. 12, p. 822.
6. Goodall: Am. Jour. Obst., lx, No. 6, p. 921.

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factor is very severe, and particularly in patients past 35 years of age, instead of elastic tissue, Nature produces a structure even lower in the scale, that is, fibrous tissue.

Pankow,[7] in an effort to find some definite pathology for these cases, examined fifty-two uteri, excluding all benign or malignant new formations and fresh or old inflammation. He says:

From a comparative anatomic examination of uteri from bleeding and non-bleeding multiparæ and nulliparæ there is no evidence of anatomic change to account for hemorrhage. All the changes in the myometrium considered in causal relation with bleeding are found only in part of the clinical bleeding cases, and are found in others having no clinical history of bleeding.

He concludes that "there is therefore nothing characteristic for bleeding uteri."

In his later paper Anspach[8] minimizes the influence of the arterial and muscular changes in the causation of hemorrhage and suggests that the cause is some other condition, as endometritis, lacerations, displacement of the uterus, pelvic inflammation or pelvic congestion from disease of the heart or kidneys. The objection to considering these conditions as the primary cause is the fact that they are so commonly found without any accompanying disturbance of the menstruation.

Out of twenty-five patients who have had a hysterectomy for hemorrhage in the past five years, I have studied the uteri of eleven. These were all in which I was able to find both the specimen and a history sufficiently detailed to justify examination. In addition to these I have studied the uteri from three other multiparæ which had been removed for other causes; one an enlarged uterus that had been causing pain, one a complete prolapse, and one for a very hard suspicious cervix, although curettings and pieces of the cervix were reported not malignant. This patient was one year past

7. Pankow: Ztschr. f. Geburtsh. u. Gynäk, lxv, 336.
8. Anspach: Surg., Gynec. and Obst., lx, No. 3, 315.

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the menopause, with no hemorrhage, but a slight leukorrhea.

Specimens were taken from just below the level of the tubes, about the internal os and from the cervix where it had been removed. Sections were made to include the entire thickness of the uterine wall, and were stained with hematoxylin and eosin, Van Giesen, Weigert and Van Giesen and Weigert carmin.

Gross Pathology.—On account of the hardening and shrinkage, it was very hard to draw conclusions concerning the size of the uterus, particularly as many of them had been removed by a supravaginal hysterectomy. Those that had been removed recently all showed an enlargement of varying degree. On cut section the vessels stand out quite prominently and appear to be larger in size and more numerous than normal. I was able to be more certain of this in three cases in which operation had been performed recently. In the specimens that had been in preservation for a long time, this feature was not so apparent.

It would seem that this increase in number and size of the vessels had some etiologic relation to the hemorrhage.

Endometrium.—One patient had a polypoid endometritis with a history of a curettement two years previously and removal of a polypus at that time. The endometrium in the other ten showed varying degrees of thickening, depending on the relation to the menstrual period, but nothing that was characteristic of hemorrhage could be found.

Muscle.—There was in all the cases some increase in connective tissue. In some the fibrous tissue predominated, in others the elastic. The development of elastic tissue between the muscle bundles did not seem to bear any relation to the severity of hemorrhage either for or against it, *e. g.*, in Case 1 with a moderate development of elastic tissue there was very severe hemorrhage, and in

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Case 2 with equally severe bleeding there was a very marked increase of elastic tissue. The same can be said of the fibrous tissue. No difference could be detected by the pathologic examination between the cases with hemorrhage and those having no such history.

Blood-Vessels.—The arteries all show some increase of elastic tissue, particularly around the vessel. This, I take it, is the subinvolution to which Goodall called attention.

But I could not trace any connection between the amount of elastic tissue and the severity of the hemorrhage, or its presence or absence.

There is one class of cases to which little attention has been given. That is those which show a marked dilatation or varicose condition of the veins of the uterine wall.

The only case I have been able to find in which there has been a hemorrhage from a rupture of such a vein is the one reported by Dr. Simpson, in 1905.[9] But I have records of four others in which there was a very decided dilatation of the veins, particularly of the cornu of the uterus and a varicose condition of the veins of the broad ligament.

In all but the first of these cases the diagnosis was made before operation by Dr. Simpson. In all the uterus was very soft and there were varicose veins of the vagina or labia; so that it would seem possible to make at least a tentative diagnosis before operation where the patient gives a history of menorrhagia or metrorrhagia, where a very soft uterus is found on examination and the curet shows carcinoma not present. Such patients are likely to have varicose veins in other parts of the genital tract.

Microscopic examination in these eleven cases failed to show anything present in the cases of hemorrhage that was absent in the ones without such a history, or the converse; so that I must agree with Pankow, who

9. Simpson: Am. Jour. Obst., lii, No. 5.

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concludes that it is impossible to tell from the history what the microscopic picture will be, and also that it is impossible from the miscroscopic examination to construct a clinical picture.

It has long been known that proper uterine contraction is the chief factor in the control of normal uterine bleeding.

Attention was directed to this again by Findley,[10] and recently by Norris and Barnard.[11] These writers called attention to the fact that the menstruating uterus is larger and has a larger cavity than the non-menstruating one. Bell and Hicks[12] have shown a regularly recurring contraction in the menstruating uterus of rabbits which were absent at other times. This leads us to believe that during the interval between menstrual periods the uterine muscle is in a state of tonic contraction and that there is during the menstrual period a relaxation and consequent hemorrhage. The relaxation and coincident hemorrhage that occurs at times during a curettement is a common experience, and the necessity of securing proper uterine contraction post-partum is well known. The influence of ergot in the control of hemorrhage is equally well known.

With our present pathologic methods it is impossible to estimate the functional power of muscle tissue, so that it is not possible to demonstrate loss of functional power of the uterine muscle.

But it is now known that the increase of elastic and fibrous tissue in the multiparous uterus, although very common, is pathologic and due to some disturbance during the puerperium. It would seem reasonable to infer that there has been some loss in strength in the muscle, either from the same condition which caused the increase in connective tissue, or as a result of its presence.

10. Findley, Palmer: Am. Jour. Obst., lii, 71.
11. Norris and Barnard: Am. Jour. Obst., lxi, 753.
12. Bell and Hicks: Brit. Med. Jour., 1909, i, 517.

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This would seem to me to furnish the predisposing cause for hemorrhage.

From the fact that this disturbance must have been active and produced its effect during the last puerperium, which in many cases was a number of years before the onset of the hemorrhage, we must look to something other than these puerperal changes for the immediate cause of the bleeding.

I would suggest that the increase in size and number of the vessels seen has some and possibly a very decided influence.

Whether this is an actual increase in vessels or merely a dilatation of those already present we do not know. The latter is more probable.

As I have stated, lacerations and displacements without excessive bleeding are so common that they do not seem to be an adequate cause of hemorrhage. One of my cases had a prolapse fourteen years before the beginning of her menorrhagia, and this was the only one of a moderately large series of prolapse cases in which bleeding of any moment occurred.

Four of my eleven patients had probably had chronic nephritis as shown by the urinary findings. Two patients had had recent operations for repair of laceration, and bleeding became so severe while they were in bed that hysterectomy was necessitated. Another one had had a recent abortion and mild infection with a consequent local congestion. The other five gave no history of anything that would seem to be an adequate exciting cause except that they were all in the neighborhood of 40 years of age, when it is common to find general arteriosclerosis and a general rise of blood-pressure. This would seem to be worth investigating carefully.

Although I admit that my cases are too few to permit definite conclusions to be drawn, yet I would suggest as immediate causes for hemorrhage, (1) the increase in size and number of the blood-vessels, (2) a general

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Fig. 1.—Normal vessels from girl aged 18. Never pregnant. uterus removed on account of double pyosalpinx.

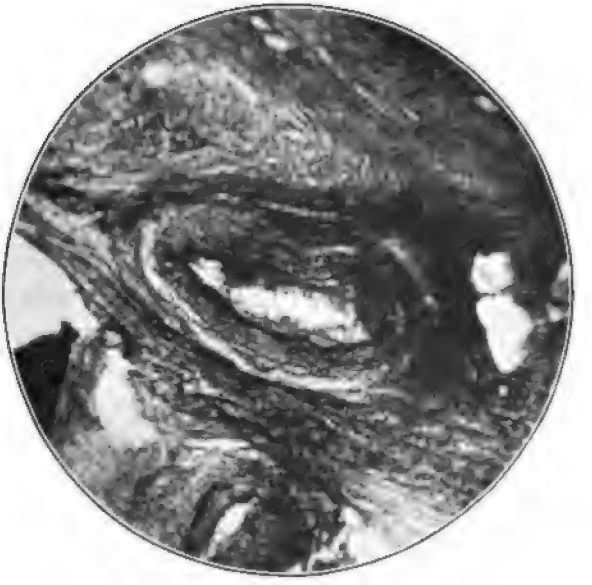

Fig. 2.—Case 8—Moderate hemorrhage. Moderate arteriosclerosis.

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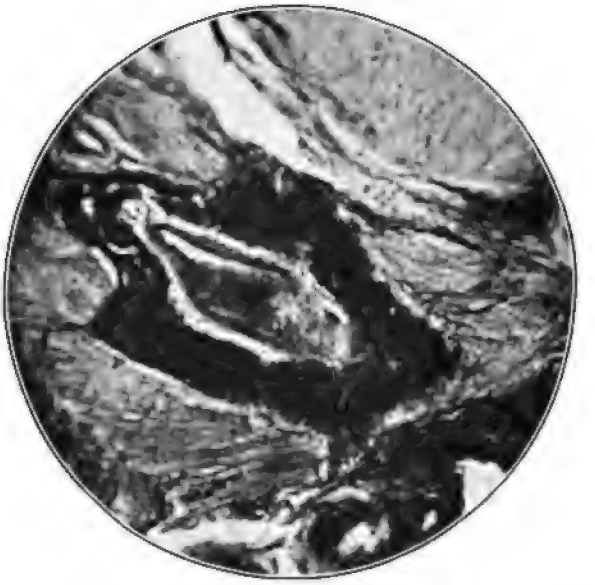

Fig. 3.—Case 5—Quite severe hemorrhage. Marked arteriosclerosis.

Fig. 4.—Case 9—Very severe hemorrhage. Moderate arteriosclerosis.

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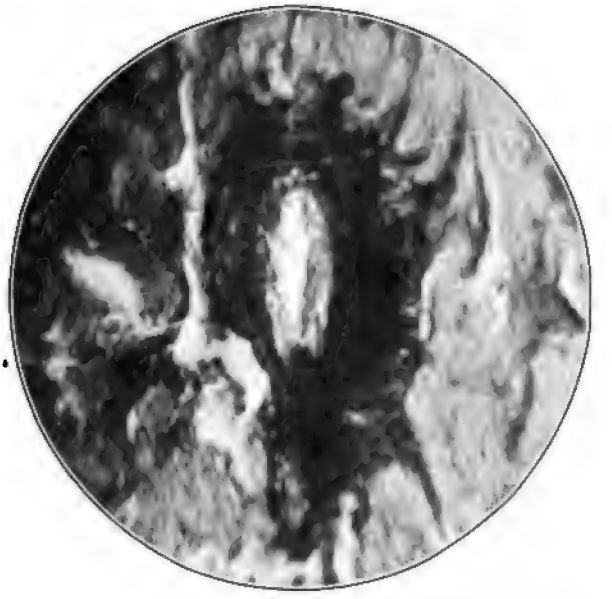

Fig. 5.—Case 3—Moderate hemorrhage. Marked arteriosclerosis.

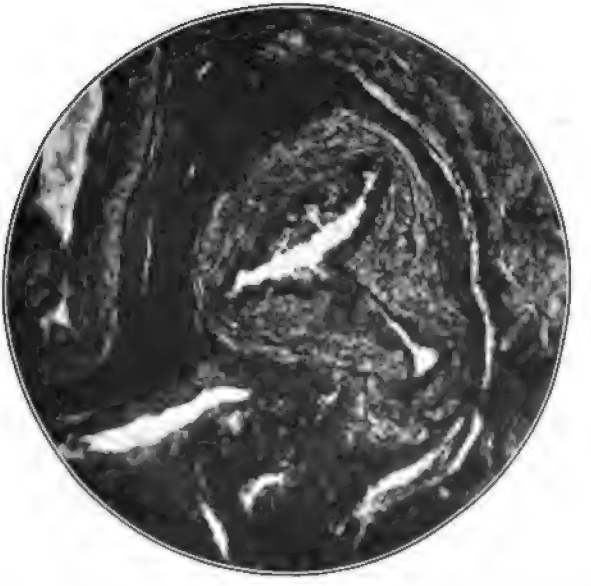

Fig. 6.—No hemorrhage. Very marked arteriosclerosis about vessels. Patient aged 50; 6 children. Uterus removed on account of chronic metritis and cervicitis. Menopause 1 year before.

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Fig. 7.—No hemorrhage. Quite marked arteriosclerosis. Excess of elastic tissue in vessel walls. Patient aged 41. Menstruation normal. Prolapse of uterus.

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increase of blood-pressure from kidney disease or general arteriosclerosis, (3) local acute congestions, (4) and anything that causes a general or local loss of muscular tone.

Treatment.—One cannot pass these cases without mentioning the necessity of excluding carcinoma. This can usually be done only by the examination of curettings and in some a section from the cervix. Even a history of hemorrhage for a number of years previous is not sufficient, as carcinoma may be a later development. This was the case in No. 3 of my series. There was a history of menorrhagia for four years, with the onset of metrorrhagia fifteen months before. At the time of operation a border-line case of carcinoma of the cervix was found.

The majority of the cases come finally to hysterectomy and we would agree with Gardner and Goodall[13] that we should be even more radical in advising this course than we have been in the past.

CONCLUSIONS

1. Proper uterine contraction is essential to the control of uterine bleeding.

2. There is no definite pathologic condition present in these cases that is not found in others not giving any history of hemorrhage, with the probable exception of the increase in number and size of vessels.

3. Some loss of functional power of the uterine muscle is the predisposing cause of bleeding in cases of arteriosclerosis.

4. This loss of functional power is due either to the development of fibrous and elastic tissue from subinvolution, or to the condition which caused this subinvolution.

5. The exciting causes are probably many. I would suggest the increase in size and number of vessels, gen-

13. Gardner and Goodall: Brit. Med. Jour., 1906, ii, 1176.

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eral increase in blood-pressure from kidney disease or general arteriosclerosis, passive congestion from heart disease, local congestions, or general muscular weakness.

I want to take this opportunity to express my indebtedness to Dr. Simpson for the privilege of studying these cases from his clinic, and to Dr. Proescher for his help with the pathologic work.

REPORT OF CASES

CASE 1.—Mrs. B., aged 29, admitted June 3, 1907; married, two children, two abortions; last seven weeks ago; recent menstrual history, profuse and irregular; almost constant and profuse bleeding since last abortion; dilatation and curettage on admission; bleeding not controlled; very severe hemorrhage two weeks later.

Operation.—June 21, 1907, a supravaginal hysterectomy and bilateral salpingo-oöphorectomy were performed.

Gross Pathology.—Uterus about three times normal size, very soft and flabby; palpable arteriosclerosis of uterine arteries; endometrium not thickened; tubes closed, ovaries slightly cystic.

Microscopic Examination.—Endometrium normal; moderate, diffuse increase of fibrous tissue throughout the muscle; moderate increase of elastic tissue around vessels and in the subperitoneal layer.

CASE 2.—Mrs. F., aged 40, was admitted Sept. 7, 1907. Puberty occurred at 15; menstruation was regular, lasting from three to six days; married at 19; seven children, youngest 5 years old; no abortions. For the last two years patient had been menstruating irregularly at eleven to twenty-four-day intervals, period lasting from three to six days and being very profuse, leaving her weak after each period; no interval bleeding.

Operation.—Sept. 9, 1907, dilatation and curettage perineorrhaphy, supravaginal hysterectomy and left salpingo-oöphorectomy were done.

Gross Pathology.—Endometrium appeared normal, and reported not malignant from frozen section; uterus size of five weeks' gestation; palpable arteriosclerosis of uterine arteries; in fundus and particularly in both cornua are large veins 2 to 4 mm. in diameter; tubes normal; both ovaries slightly cystic.

Microscopic Examination.—Marked increase of fibrous tissue and of elastic tissue about vessels, most pronounced in vascular layer.

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CASE 3.—Mrs. O., aged 42; puberty at 15; menstruation was regular each twenty-eight days, lasting from four to 5 days; amount moderate. Married at 24; three children; last twelve years ago; no abortions; repair of laceration one year ago; moderate menorrhagia the past year.

Operation.—May 4, 1908, combined vaginal and abdominal hysterectomy, bilateral, salpingo-oöphorectomy and appendectomy.

Gross Pathology.—Uterus slightly enlarged; palpable arteriosclerosis; tubes normal; ovaries cystic.

Microscopic Examination.—Very marked, diffuse increase of fibrous tissue; marked increase in elastic tissue about the vessels.

CASE 4.—Mrs. W., aged 48, admitted May 11, 1908; puberty at 12; menstruation regular each twenty-eight to thirty days, lasting from three to seven days; irregular past two years; moderate menorrhagia. Married at 29; one child 16 years old; no abortions.

Operation.—May 13, 1908, combined vaginal and abdominal hysterectomy and right salpingo-oöphorectomy.

Gross Pathology.—Uterus enlarged, twice normal size; palpable arteriosclerosis; right tube normal; right ovary cystic.

Microscopic Examination.—Diffuse increase of fibrous tissue through all layers, more marked in vascular and submucous layers; marked increase of elastic tissue about the vessels and vascular layers.

CASE 5.—Mrs. E., aged 47, admitted Jan. 11, 1909; puberty at 14; menstruation irregular. Married at 26; four children, youngest 14; no abortions; menstruation irregular for eleven years; for past two years menorrhagia and metrorrhagia quite severe.

Operation.—Jan. 15, 1909, supravaginal hysterectomy.

Gross Pathology.—Uterus normal size; palpable arteriosclerosis; tubes normal; left ovary slightly cystic (not removed).

Microscopic Examination. — Endometrium not thickened; chronic interstitial endometritis; marked increase of fibrous tissue through all layers; marked increase of elastic tissue around vessels and submucous and vascular layers.

CASE 6.—Mrs. T., aged 42, admitted Jan. 24, 1909; puberty at 12; menstruation irregular; each four to seven weeks; lasting from seven to ten days; one child; menorrhagia past six years. Two years ago dilatation and curettement for cervical

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polyp and perineorrhaphy were done. Menorrhagia has continued.

Operation.—Jan. 27, 1909, combined vaginal and abdominal hysterectomy, bilateral salpingo-oöphorectomy and appendectomy were performed.

Gross Pathology.—Polypoid endometritis; varicose veins of both cornua of uterus, diameter 2 to 4 mm.; tubes adherent, closed; ovaries cystic.

Microscopic Examination.—Marked increase of fibrous tissue and vascular layer, chronic interstitial endometritis; not glandular, but hypertrophic. Slight increase in submucous layer; slight increase of elastic tissue about the submucous layer, no increase in vascular layer; slight diffuse increase in subserous layer.

CASE 7.—Mrs. W., aged 43, admitted Feb. 4, 1909; puberty at 18; menstruation regular every twenty-eight days, of five-days' duration; moderately profuse. Married at 21; seven children; last, eight years ago; one abortion ten years ago. First noticed prolapse of uterus seventeen years ago; for past two and one-half years menstruation irregular; every two to five weeks, lasting five days; profuse menorrhagia.

Operation.—Feb. 6, 1909, vaginal hysterectomy and perineorrhaphy.

Gross Pathology.—Hypertrophy of the cervix; uterus normal size; palpable arteriosclerosis.

Microscopic Examination.—Endometrium thickened; interstitial endometritis; no increase of glandular tissue; marked increase of fibrous tissue throughout, and of elastic tissue about all vessels.

CASE 8.—Mrs. A., aged 44; puberty at 12; menstruation regular every twenty-eight days, three to four days' duration. Married at 22; four children last nine years; all died in infancy; four miscarriages; last five years ago; for past six months moderate menorrhagia and metrorrhagia.

Operation.—Sept. 14, 1906, perineorrhaphy, supravaginal hysterectomy and appendectomy.

Gross Pathology.—Endometrium about normal; uterus two and one-half times normal size; palpable arteriosclerosis; varicose veins in both cornua; tubes and ovaries normal.

Microscopic Examination.—Marked diffuse increase in fibrous tissue in submucous and vascular layers; slight increase in elastic tissue in vascular layer.

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CASE 9.—Mrs. P., aged 31; puberty at 17; menstruation regular, lasting from six to seven days. Married at 20; three children; last, two years old; one miscarriage, four weeks ago; for past year patient has had a profuse menorrhagia, lasting two or three weeks; very severe bleeding for nine weeks, about six months ago; stopped for a short time, but has bled almost constantly and in variable quantity since.

Operation.—Feb. 1, 1910, supravaginal hysterectomy and appendectomy.

Gross Pathology.—Endometrium normal; uterus normal size; palpable arteriosclerosis; varicose veins of both cornua, 3 to 6 mm. diameter; tubes and ovaries normal.

Microscopic Examination.—Endometrium normal; marked increase of fibrous tissue in all layers; moderate increase of elastic tissue about the vessels and vascular layer.

CASE 10.—Mrs. G., aged 50, admitted Jan. 26, 1910; puberty at 15-16; menstruation regular, of from three to four days' duration. Married at 18; eleven children, youngest 12; one miscarriage, fourteen years ago; four years ago patient noticed menstruation became more profuse and irregular, at two or three weeks' intervals; duration, one week; fifteen months ago she noticed slight metrorrhagia; severe hemorrhage, Nov., 1908, lasting ten days; almost constant bleeding since.

Operation.—Jan. 27, 1910, combined abdominal and vaginal hysterectomy and bilateral salpingo-oöphorectomy.

Gross Pathology.—Carcinoma of cervix with involvement of the right broad ligament; uterus enlarged twice normal size; palpable arteriosclerosis; tubes normal; ovaries slightly cystic.

Microscopic Examination.—Squamous carcinoma of the cervix; endometrium normal; marked diffuse increase of fibrous tissue; marked increase of elastic tissue, particularly about the vessels.

This illustrates the necessity of investigating these cases carefully, as undoubtedly the bleeding of the arteriosclerosis had antedated for some time the development of the carcinoma.

CASE 11.—Mrs. E., admitted March 3, 1910; puberty at 12; menstruation regular, lasting from three to five days. Married at 23; seven children, youngest three years old; two miscarriages, last eight months ago; menorrhagia began two years ago; dilatation and curettement eleven months ago; bleeding controlled for three months; since last abortion there has been profuse menorrhagia and metrorrhagia, almost constantly.

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Operation.—March 6, 1910, supravaginal hysterectomy and perineorrhaphy.

Gross Pathology.—Uterus slightly enlarged; endometrium normal; palpable arteriosclerosis; large vein, 5 mm. diameter, in left cornu; tubes normal; ovaries normal.

Microscopic Examination.—Mucosa thickened; slight increase in glandular tissue; marked diffuse increase of fibrous tissue; marked increase of elastic tissue around the vessels.

ABSTRACT OF DISCUSSION

DR. EMIL NOVAK, Baltimore: It seems to me that the special importance of the study of arteriosclerosis of the blood-vessels of the uterus lies in the possible relation which it bears to uterine bleeding. That, I think, has been well emphasized by Dr. Chalfont. I agree that in certain cases uterine bleeding may be due to such conditions. Furthermore, we also recognize the fact that uterine bleeding is influenced to a considerable degree by the condition of the muscular tissue of the uterus. This seems to be pretty well demonstrated by the manner in which post-partum hemorrhage may be controlled by producing strong uterine contractions. It is not difficult to believe that the fibrous tissue of the uterus may also have some influence on uterine bleeding, as urged by Theilhaber. The point to be emphasized is that in a considerable number of cases—how large no one knows—uterine bleeding is present in the absence of any demonstrable pathologic lesion. It is unjustifiable to strain the imagination into believing that a slight increase in fibrous tissue, or perhaps a slight thickening of the arteries, is the cause of the bleeding, when these conditions, as a matter of fact, may represent normal variations. It seems to me that in a considerable number of cases of uterine bleeding we must invoke, not alone anatomic explanations, but also physiologic causes. Morris has referred to the present as the physiologic era in surgery. We may say also that this is the physiologic era in gynecology. In the explanation of uterine bleeding, we must bear in mind the normal physiology of menstruation. This concerns not only the myometrium, the endometrium and blood vessels, but also some underlying cause which most of us believe to be an internal secretion of the ovary. The importance of the internal secretions of the body has been greatly emphasized within recent years, but not sufficient stress has been laid on their relation to the physiology of the female genital organs. That there is such a relation permits of no doubt. I would like, if time permitted, to speak of the influence in this connection of the pituitary bodies, as has been shown experimentally by Dr. Cushing and others, and also to emphasize the importance of the thyroid hormone or hormones in connection with menstrual physiology and pathology.

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In many cases of arteriosclerosis there is no uterine bleeding, and in many cases of uterine bleeding in which arteriosclerosis is given as a cause, such a condition does not exist. In many cases the so-called arteriosclerosis is really a normal process. This has been very well shown by Dr. Goodall and others, in the fact that we find thickening of the arteries in the uteri of women who have borne children. I would like, in short, to re-emphasize the point that in many of these cases of uterine bleeding there is no local anatomic cause whatsoever to which we can assign this symptom.

Dr. Collin Foulkrod, Philadelphia: The discussion of arteriosclerosis, coming after the discussion of endometritis, makes a very pertinent point come up: Is not the bleeding coming from the same cause coming from two different points in the uterus? In the first place the arteriosclerotic bleeding is due, no doubt, to some cause within the patient's body. Contrary to Dr. Novak, if it is not due to the intima, there must be some cause which acts on the intima of the vessels and causes a condition, which is either anemia of the structures, which will not permit strong contraction of the blood vessels, or some other condition which precludes the possibility of contraction of the blood vessels. The result is the same. The few cases that have been classified have been those which we have not attributed to the arteriosclerosis or the general condition. There are few cases in which you do not find some demonstrable lesion either in the system or in the uterus itself.

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THE ETIOLOGY OF ECLAMPSIA

EDWARD P. DAVIS, M.D.
AND
COLLIN FOULKROD, M.D.
PHILADELPHIA

ECLAMPSIA A DISTINCT DISEASE

The most recent conception of eclampsia is that it is the culmination of toxemia of varied origin. Its crises are manifested by convulsions; explosions of pain, cerebral or substernal; gastric and intestinal irritation; blood or blood-vessel dyscrasia, producing pernicious anemia and hemorrhages, retinal, of mucous membranes, retroplacental, cerebral or general; or as an acute degenerative process of the liver or other organs. We wish to develop this idea to prove that eclampsia is a distinct disease, with a definite pathologic picture, that at times convulsions prove the constant feature, but not invariably so.

We may have eclampsia with a typical picture without convulsions. In such cases the eclamptic seizure is manifested (1) by a headache of agonizing, blinding type, in which the patient may become unconscious from the pain; or (2) perhaps as a burning substernal pain, which is, in our experience, an almost constant feature of the preeclamptic stage, and may also accompany the convulsive type; (3) as a form of blood disintegration in which the poison may produce an anemia, as marked as pernicious anemia, and giving the same blood picture and physical signs, perhaps somewhat more rapid in its course; (4) as an irritant poison to the blood-vessels,

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as well as to the blood, a condition in which the blood contains various unformed principles or such an excess of normal principles as to produce irritation and even disease and disintegration of blood-vessel walls, which conditions result in sharp hemorrhage from any of the mucous membranes, from the placental site either before or especially after delivery, and into the retina or brain substances; and (5) as a type of acute degeneration of liver substance, simulating acute yellow atrophy; under such conditions other organs may also share in the degenerative process, but not so markedly as the liver.

We then believe that any one of the foregoing conditions may exist as a type of eclamptic seizure, that such patients may have associated with these other types the convulsive effort also, but that a certain percentage of them may become unconscious and die from these causes without at any time having convulsions, and would then have died of eclampsia.

THE TOXEMIA OF PREGNANCY

Any inquiry into the etiology of eclampsia includes a study of the toxemia of pregnancy, particularly that developing after the twelfth to sixteenth week of gestation. As a constant factor in all forms of eclampsia is found some form of toxemia of longer or shorter duration. This must be thoroughly understood in order to grasp the cause of the disease.

We have been called to see a private patient whom we had not known to be either pregnant or ill and found her in the last efforts of a severe and overwhelming convulsion from which she died in less than twenty minutes. This patient had been talking cheerfully to her mother within the hour, had walked up stairs to her room and on hearing her fall the family sent for a physician. On inquiry we found that she was about four and a half months pregnant, that she was excessively constipated and had had a severe headache the evening

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previously. This was a toxemia of severe grade and of short duration, but nevertheless, a toxemia.

Toxemia as an intermediary step between the ultimate cause and the critical manifestation, is the result of some acute or chronic disturbance of a vital organ, either excretory or secretory. Such disturbance may be purely functional or may be constant, the latter as the result of permanent pathologic changes. Toxemia may be classified from the organ showing the greatest amount of disturbance as gastro-intestinal, hepatic, nephritic, thyroid or parathyroid, placental and fetal.

Whether this disturbance is due to the fact that some perverted metabolism in that particular organ is a primary cause for the toxemia remains to be proven. The study of the pathology and the chemistry of the pathology of these organs and their secretions or excretions, however, must give us further light on the ultimate cause. In succession studies were made of the sulphates, creatinin, the chlorids, lactic acid, acetone bodies, indican, urea and of the nitrogenous principles, in order to discover a chemical cause or defect in metabolism evidenced by some chemical changes in excretions, our inability to study thoroughly all of the excretions being the handicap in this direction. With the exception of urea and the protein principles, these studies and theories have thrown little, if any, light on the etiology.

The work of Zweifel,[1] Ewing and Wolf,[2] Williams and others has, however, in the past few years fixed firmly some facts in regard to the nitrogenous excretion in the urine of utmost value in the study of eclampsia.

By tracing the nitrogen in the urine back to its source it was found that the normal excretion in health according to Folin, is as follows:

1. Zweifel: Arch. f. Gynäc., 1904, lxxii, 1905, lxxvi; Zentralbl. f. Gynäk., 1909, No. 26.
2. Ewing and Wolf: Jour. Med. Sc., May, 1906; Am. Jour. Obst., March, 1907.

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Total N in 24 hours.....		15.8 gm.
Urea .....N	87.7	per cent.
Ammonia .....N	3.3	per cent.
Creatinin .....N	2.7	per cent.
Uric Acid .....N	0.7	per cent.
Purin Bodies .....N	0.7	per cent.
Undetermined .....N	5.6	per cent.

It was found that in eclamptic patients the urea nitrogen is persistently lowered sometimes even to below 50 per cent. of the total, while usually the ammonia nitrogen is above normal, although it may be below. But as a constant factor the undetermined nitrogen is high, taking up much of the lowered urea content.

From these variations we deduce the fact that somewhere in the organism there is a deficient changing of ammonia and amino-acids into urea. This has been called "deficient desamidation" by Ewing, who asserts that the process is more than an oxidation. This work is in a great measure performed by the liver, and therefore we are not surprised to find the liver most severely involved. We should be misled however, if we considered any condition of the liver as a primary cause, for the process of "desamidation" is complex, so complex that no one organ can be responsible.

Though we are forced to admit that these studies give no definite light as to the etiology of eclampsia, yet they have proved of value in treatment and in prognosis. We have found that in those cases in which the nitrogen ratio was disturbed the greater liver involvement occurred, producing the most severe eclampsia and usually at some time, unless corrected, ending in convulsions.

Studies have also been pursued along the line of thyroid secretion. We know that normally during pregnancy the thyroid is enlarged, and its function evidently increased, and from purely theoretical standpoint we were led to suppose that in this internal secretion was

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found something to help the blood and body organism combat syncytial invasion. In a certain type of cases manifested by a high grade of toxemia we find hemorrhages from the mucous membrane of the bowel, stomach and mouth and an anemia showing marked blood disintegration and leading finally to eclampsia and perhaps death of the fetus. We have found that the careful administration of thyroid extract in small doses throughout the pregnancy has in future pregnancies after several disasters produced healthy children and that the mothers are even able to nurse the babies. In this type of cases also, the nitrogen partition is markedly altered, the alteration pursuing the same general type of eclamptic urine.

In past years the kidneys were blamed for much of this trouble. We now know that the cases are few in which the breakdown of the kidney in any way acts as a primary factor. The kidneys are secondarily involved in nearly all of the cases, but they may not be so even in the course of the most severe eclampsia. When the kidneys are the primary cause, we usually find widespread arterial changes and albumin and casts in the urine. There may or may not be a change in the nitrogen ratio. And we believe that such a change of undetermined nitrogen is, under these circumstances evidence of the present status of liver involvement over and above the kidney disease. The crisis of this type may assume the form of general severe hemorrhages.

There then remains the placenta and fetus to which we can ascribe a primary cause. Eclampsia occurs only in pregnancy and is a disease developing invariably after the time of placental formation. So we find in the past few years that the papers written on placental or syncytial cause of eclampsia are legion. From an exhaustive study of these theories we believe that no one has been proved, the most plausible being that based on the work

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of Bergell and Liepmann[3] (1905) and Savare[4] (1907) on the ferments, and the papers of Dryfuss,[5] Mathes,[6] etc., on autolysis. The normal placenta is rich in ferments.

1. Those acting on carbohydrates.
2. Glycolytic ferments (a question).
3. Proteolytic ferments.
4. Blood-coagulating ferments (Savare).

Any perversion of these useful ferments produces widespread disaster, namely, multiple hemorrhage and changes in the entire placental functions causing, by the retention in the mother's body of unchanged principles, an excess in her blood of principles normally changed into innocuous food for the fetus, and even autolysis of the placenta itself. When we ask, however, what causes the perversion of these normal ferments, we find no answer.

Let us quote from Holland's[7] summary of these theories:

From the foregoing account, it is obvious that, during the past six years, a number of valuable facts as to the etiology of eclampsia have been discovered. It is equally obvious that a number of worthless theories have been propounded, many of which have been disproved, but which, nevertheless, have served the good purpose of paving the way for better work. As far as it is possible to draw conclusions, the following are suggested:

1. There is no special eclamptic toxin.

2. Chemical discoveries have shown that eclampsia is an auto-intoxication, in which a profound disturbance of protein metabolism plays a chief part, the nature of which now rests on a firm basis.

3. The chief toxic substances are the products of the disintegration of protein.

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3. Bergell and Liepmann: München. med. Wchnsch., 1905, No. 46.

4. Savare: Zur Kenntnis der Fermente der Placenta, Beitr. z. chem. Physiol. u. Path. (Hofmeister), ix, 141.

5. Dryfuss: Chemische Untersuchungen über die Aetiologie der Eklampsie, Biochem. Ztschr., 1908, vii.

6. Mathes: Ueber Autolyse der Placenta, Zentralbl. f. Gynäk., 1901, No. 51.

7. Jour. Obst. and Gynec. Brit. Emp., December, 1909, p. 398.

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4. In eclampsia, intracellular ferments, especially proteolytic, are raised in activity throughout the body, causing autolysis of cells and production of the above toxic substances.

5. The primary cause of eclampsia is to be sought in the placenta.

6. As regards the connection of the placenta with eclampsia:

I. The "specific placental theory" of Veit[8] must be considered dead; the various specific placental reactions (syncytiolysis, precipitins, etc.), whether produced naturally or experimentally in animals, do not exist.

II. Placental extracts possess no special toxicity for animals, beyond causing coagulation of the blood and death from extensive thrombosis.

III. The eclamptic placenta has no special toxicity.

IV. The intracellular ferments of the placenta are increased in activity in eclampsia. In the light of present knowledge, the most probable theory of the cause of eclampsia is an intoxication of the body by the passage of ferments and autolytic products from the placenta into the circulation, the principal effect of which is increased coagulability of the blood and the activation of autolytic ferments in other parts of the body.

THE PATHOLOGY OF ECLAMPSIA

In the study of the effects of eclamptic toxins on the different organs, we find that so definite are the changes that a diagnosis can now be made post mortem without the clinical history. There is usually edema and hemorrhages in the brain. The kidneys show, in over 95 per cent. of cases, active degeneration of the parenchyma, principally the epithelium of the convoluted tubules. Even in severe cases, however, the changes may be slight. The heart shows cloudy swelling and fatty degeneration, perhaps hemorrhages and necrosis. There may be general thrombosis and hemorrhages into other organs.

We are principally concerned with the picture in the liver. The best work in this has been reported by Kon-

8. Veit and Scholten: Syncytiolyse und Hämolyse, Ztschr. f. Geburtsch. u. Gynäc., xlix; Zur placentaren Theorie der Eklampsie Aetiologie, Arch. f. Gynäk., lxxxvii; Ueber die Aetiologie der Eklampsie, Ztschr. f. Gynäk., l.

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stantinowitsch,[9] who asserts that the diagnosis may be made from the liver alone. This is a progressive change which first manifests itself by a degeneration of liver cells in the portal spaces at the periphery of the lobule, by fibrin formation and by hemorrhages, then by necrosis and extension of the process to larger areas of liver cells progressively toward the center of lobule from the periphery.

METHODS OF DIAGNOSIS

We should leave this review unfinished should we omit the methods by which we make a diagnosis of toxemia and eclampsia. Normal physiologic pregnancy is not an uncomfortable process. The deviations may begin with a slight lassitude, even hebetude, stupor and coma, or again, with melancholia, or even mania, which are all manifestations of toxemia. Usually there are progressive headache, disturbance of the stomach, disturbance of vision and constipation. The skin is dry and harsh, the lips cracked the mucous membranes of mouth parched and dry without temperature. There may be swelling of the ankles, emaciation, or perhaps a general puffiness of the skin over the entire body or only over the ankles, hands or face; there may be epigastric or substernal pain, perhaps an exaggeration of some latent nervous phenomena, as for example chorea or insomnia.

In preeclamptic toxemia and in eclampsia the blood-pressure is usually higher than normal for that patient, ranging from 170 to 180 or even 200 mm. of mercury. In the severer forms this persists, in spite of treatment, and tends to grow more marked, until convulsions or some other crisis appears. A study of the blood-pressure record should be part of the routine investigation of every pregnant patient early in the pregnancy or better still when not pregnant, a record of the patient's normal

9. Konstantinowitsch: Beiträge zur Kenntnis d. Leberveränderungen bei Eklampsie. Beitr. z. Path. Anat. u. z. Allg. Path. (Ziegler), xl.

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pressure should be secured; should the patient become toxic, one of the earliest signs of toxicity is this increased blood-vessel tension.

Since the first point noticed about the urinary findings is that there is usually a markedly decreased total daily output, we would urge you to study this point more in all pregnant patients. At times the only defect may be the lowered total daily output of an apparently normal urine. The specific gravity varies, in the inverse ratio to the quantity excreted. The next point noted is the progressive decrease in the daily output of solids. This may be studied approximately by investigating the total output of urea. We have found, however, that, up to the present time, the most definite indication of any toxemic disturbance, earlier than can be secured by any other method, is found in a study of the partition of the different forms of nitrogen found in the urine. Earlier in the paper we gave the normal ratio. The average daily output varies in pregnancy from 10 to 20 gm. per day of nitrogen excreted. It seems to be not so much the lowered output of total nitrogen within a certain range, as the definite change in the relations of the different forms. A lowering of the urea nitrogen, an increase of undetermined nitrogen, and some change in the ammonia nitrogen shows a beginning toxemia. With the tendency for these changes to persist or grow worse, we find evidence of oncoming eclampsia. Albumin is present in the advanced stages of the disease. It is entirely misleading, however, to base the diagnosis entirely on albumin, since very often it is not present in severe grades of toxemia. The presence of sugar, of acetone bodies, of an excess of indican or of peptone is an indication of faulty metabolism requiring careful watching. The presence of granular epithelial or fatty casts is positive evidence of kidney breakdown.

An early examination of the retina is of importance in all toxemic cases. We recall several patients who

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came to us, because some defect in vision led to an eye-ground examination and the advice from the ophthalmologist to seek relief for a kidney condition. The findings are those of arterial degeneration of the retinal vessels and hemorrhages into the substance of the retina.

A careful examination of the blood of toxemic patients proves of some value. In preeclamptic toxemia and in eclampsia we find a reduction of the hemaglobin and red cells with a moderate leukocytosis, the latter, on making a differential count, showing little variation from the normal.

SUMMARY

Those ideas which will prove of value from this study are as follows:

1. Eclampsia is a distinct disease with varied manifestations and a definite pathologic picture.

2. There is some relation between the fact that an altered nitrogen ratio is found in the excretions and the fact that the liver is the organ most seriously involved.

3. A study of this progressive nitrogen disturbance may prove a guide as to the point beyond which the liver involvement cannot go and allow regeneration and recovery.

4. While no placental theory has yet been proved, the most plausible theory is that some ferment from the placenta may prove responsible as a primary cause for the condition because of deficient or deranged action.

5. Any preexisting permanent pathologic condition may prove an exciting cause and still perhaps act by disturbing placental function.

6. Eclampsia should be a rare condition in the hands of a skilful, thorough investigator.

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THE TREATMENT OF ECLAMPSIA

INCLUDING A COMPARISON OF THE DANGERS OF CHLOROFORM AND ETHER IN THIS CONDITION

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AND

EDWARD T. HULL, M.D.

NEW YORK

In all branches of medicine to-day the prophylactic treatment, or preventive medicine, receives foremost consideration. Hence it is that in the treatment of eclampsia the toxemia of pregnancy, which threatens and may, or may not, eventuate in an eclamptic seizure, demands our chief attention. Whatever the exact etiology may prove eventually to be, it is generally agreed that the symptoms and pathologic changes of the toxemia of pregnancy and the puerperium are caused by some toxin or toxins circulating through the system, and that with this there is associated some fault in the elimination of the products of metabolism.

Accepting this as a working basis of etiology, the obstetrician may well be guided in the treatment of toxemia threatening eclampsia by the following five principles:

1. The products of metabolism requiring elimination should be reduced.
2. Elimination of metabolic products should be favored.
3. High blood-pressure should be reduced.
4. If the toxemia of the patient, as shown by the urine, blood-pressure and general condition, does not markedly improve under the preceding principles of treatment, or if an eclamptic seizure occurs, the uterus should be emptied.

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5. In all methods of treatment that should be avoided which will either reduce the resistance of the patient, or seriously damage any of her organs.

Let us now consider these principles more in detail.

1. In reducing the products of metabolism requiring elimination the obstetrician is brought face to face with the problem of diet for the toxemic patient. As proteid metabolism is that most often at fault, it is generally agreed that red meats should be avoided in all forms of toxemia of pregnancy and the puerperium. Although in mild degrees of toxemia, chicken and fish may be allowed, in severe forms of the condition an exclusive milk diet with large draughts of water is the diet of choice, to which are added chicken broth, fruits and green vegetables, as the toxemia diminishes. As a prophylactic measure it is our custom, during the last month of a normal pregnancy, to allow the ingestion of red meat only two or three times a week.

2. In favoring the elimination of products of metabolism, the three avenues, the skin, the urinary tract and the intestinal tract, should receive careful attention. Thus elimination through the skin by sweating, induced either by the hot-air bath or the hot wet pack, is a most useful measure in the treatment of toxemia. Elimination through the urinary tract, favored by the ingestion of large amounts of water, and elimination through the intestinal tract, favored by calomel and saline or other laxatives, and especially by colon irrigations with saline solution, are methods which at the present time are considered routine procedures in the treatment of this condition.

3. In the reduction of blood-pressure, while venesection is the choice of many obstetricians, and was formerly quite extensively employed by one of us, its use has now been superseded at the Sloane Maternity by veratrum viride, nitroglycerin and chloral, and with better results.

Our method of using these drugs in toxemia threatening eclampsia is as follows: Chloral (30 grains) is

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administered per rectum as an initial dose and then repeated in doses of from 20 to 30 grains from every four hours to every six hours, according to the restlessness of the patient. Nitroglycerin gr. 1/50-gr. 1/100 from every two hours to every four hours is given hypodermatically. If under the use of the larger doses of these drugs the tension still remains high we depend on the use of veratrum viride rather than venesection.

The preparation used has been Squibb's fluidextract of veratrum and the dose employed has scarcely ever exceeded 5 minims. Our rule is to give 5 minims hypodermatically and watch the effect. As the frequency is usually reduced with the tension, it is our custom to be largely guided in repetition of the dose and in the size of the dose, by the frequency of the pulse, although the reduction in the tension is the object desired.

If at the expiration of from one to two hours the pulse has not been reduced in frequency to 100 or below and the tension correspondingly reduced, a second hypodermatic injection of veratrum 1 to 3 minims is given. The tension of the pulse is then controlled, if not kept low by the continued use of the nitroglycerin, by repeated doses of veratrum 1 to 3 minims every four hours.

4. To repeat the fourth principle stated earlier in the paper, if the toxemia of the patient, as shown by the urine, blood-pressure and general condition, does not markedly improve under the preceding principles of treatment, or if an eclamptic seizure occurs, the uterus should be emptied. At the Sloane Maternity Hospital some years ago a series of patients was treated on the palliative plan, favoring elimination without emptying the uterus, but the mortality was so much greater than when the fetus and its toxins were eliminated from the uterus and the system, that for the past ten years the rule has been, given an eclamptic seizure, or a toxemia so severe as to strongly threaten eclampsia in spite of treatment, to proceed to empty the uterus.

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Fig. 1.— Liver of eclamptic patient.

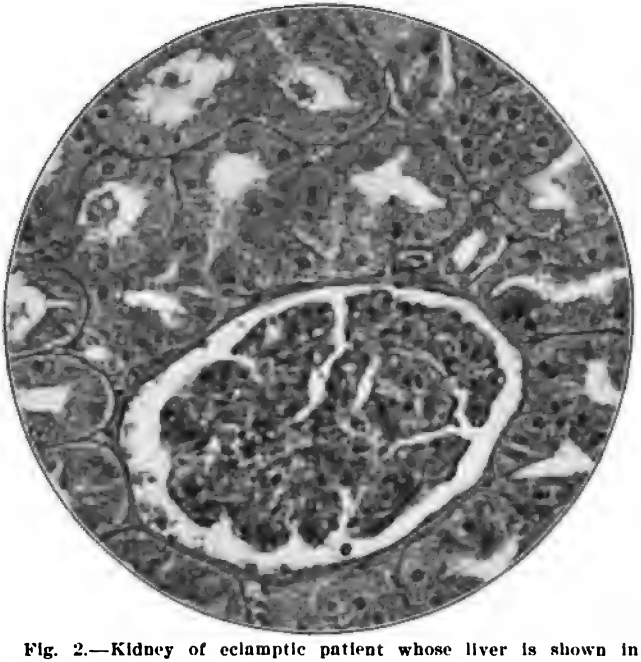

Fig. 2.—Kidney of eclamptic patient whose liver is shown in Figure 1.

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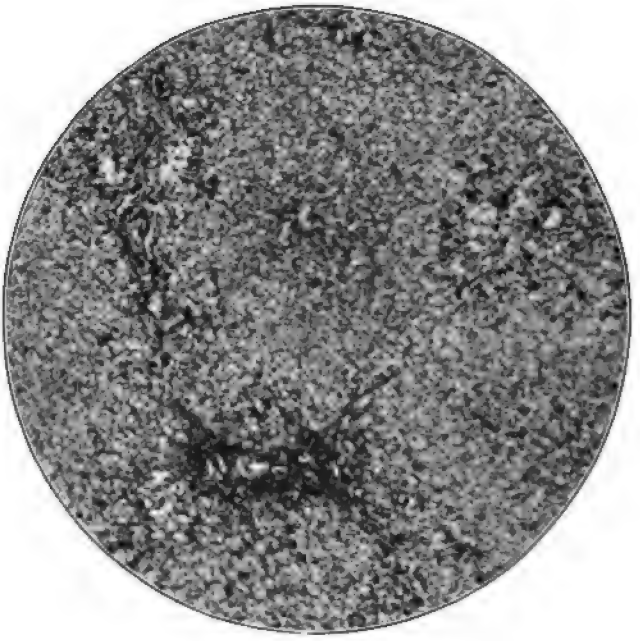

Fig. 3.—Liver of another eclamptic patient.

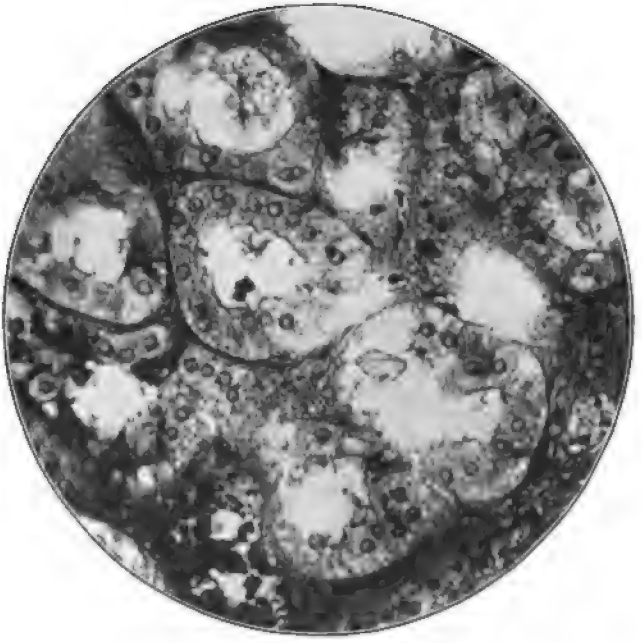

Fig. 4.—Kidney of eclamptic patient whose liver is shown in Figure 3.

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In carrying out this rule the fifth principle of treatment deserves marked emphasis and will be restated here. *In all methods of treatment, that should be avoided which will either reduce the resistance of the patient or seriously damage any of her organs.*

This principle has an important bearing on the method of emptying the uterus. Having decided that the fetus should be removed from the uterus, the next questions are, How? and When? If the cervix is soft and dilatable and the patient has had one or more convulsions, our own preference is manual dilatation and delivery usually by version.

If on the other hand the cervix is long and rigid we believe that the patient is better off, even if delivered several hours later, to have her cervix softened and dilated by the preliminary use of the elastic bag, or bags, rather than to be delivered by an immediate accouchement forcé, which leaves her in marked shock and with cervix deeply lacerated, perhaps to the vaginal junction. Our observation leads us to believe that pronounced shock and deep lacerations lessen both the resistance of the patient and her chances of recovery. In the cases of long rigid cervix, which do not readily dilate under the use of the elastic bag, the so-called vaginal Cesarean section has a distinct and valuable field of usefulness. In a restricted class of these cases future experience may prove the abdominal Cesarean section to be the operation of choice.

SELECTION OF AN ANESTHETIC

In the treatment of eclampsia one of the most important questions is, What anesthetic shall be used and how shall it be employed? For many years at the Sloane Maternity Hospital, New York, it was our custom to administer chloroform to every patient suffering from eclampsia and to administer it to the patient each time she had a convulsion. This meant that often a physician or a nurse was detailed to sit beside a patient during

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a whole day, or a whole night, with a chloroform bottle and mask in hand and with instructions to administer chloroform at the first indication of a convulsion. This was done with the idea that the convulsions were in themselves an element of grave danger to the patient and should be controlled if possible. As we look back on the treatment now we appreciate that many patients were kept more or less under the influence of chloroform for many hours at a time.

Furthermore, if the uterus required to be emptied for the toxemia of pregnancy, shown in the early months by pernicious vomiting, or in the later months by eclampsia, chlorofrom was the anesthetic usually employed.

In the light of our present knowledge concerning the effect of chloroform, the question arises: Does its use in puerperal toxemia and eclampsia conform to our fifth principle of treatment recommended above, viz.: "Harmful remedies should be avoided"? We believe that the question should be answered in the negative; and we propose to show that chloroform is dangerous in puerperal toxemia and eclampsia; that ether is safer and is to be recommended when anesthesia is required in this condition. Recent studies of the pathologic changes produced by eclampsia, delayed chloroform poisoning and chloroform anesthesia have shown a striking similarity in the findings in all three conditions.

The pathologic picture in each is that of congestion, hemorrhage, degeneration and necrosis. Our knowledge of the pathology of eclampsia is of comparatively recent date, but thanks to the work of Jurgens, Schmorl, Williams, Ewing, Welch and others the lesions are now well recognized and generally accepted.

The changes are mainly those of congestion, hemorrhage, parenchymatous degeneration and necrosis. The liver and kidneys are the organs chiefly involved. The lesions vary with the clinical type; Thus, in those cases characterized by vomiting, jaundice, a tendency to hem-

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orrhage, with little edema and slight albuminuria, the liver is the organ most involved, as seen in Figures 1 and 2, which represent respectively the liver and kidney of the same patient. Here the liver is markedly involved and the kidney but little involved.

On the other hand in the cases characterized by headache, high tension pulse, marked disturbance of the nervous system, marked albuminuria and edema, the kidney changes are more marked as is seen in Figures 3 and 4, which represent the liver and kidney respectively of another patient. Here the liver changes are slight and the kidney changes very pronounced.

Although many border-line cases present themselves, still the two distinct types are easily recognized in every large maternity service. The lesions in the liver vary from granular and fatty degeneration, with congestion, to necrosis with almost complete dissolution of the liver parenchyma. This necrosis begins at the center of the lobule and extends towards the periphery, leaving only a mass of granular detritus surrounding the central vein, the nuclei and cell contents disappearing with only a reticular network in the place of the liver cells. Thromboses with hemorrhage occur throughout the lobule more often at the periphery (Figure 5). The organ may be swollen or diminished in size, according to the change in the parenchyma. It usually shows a yellowish color and may have hemorrhages under the capsule.

The kidneys are swollen, the cortex thickened, pale and congested, the markings less distinct, and the capsule not adherent. Microscopically the cells of the cortical tubules are swollen, in many places disintegrating. The vessels are injected and the tubules contain much granular material. Other changes described are moderate fatty degeneration of the heart; edema, congestion, and hemorrhages in the brain. The body often shows edema, subcutaneous hemorrhages and jaundice. The above are the pathologic changes found in the severe grades of toxemia of pregnancy and eclampsia.

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Now what are the pathologic changes produced by chloroform, which until recently has been largely used in the toxemic condition?

Delayed chloroform poisoning as such has been frequently recognized and carefully studied both clinically and pathologically for the last twenty years. Many writers have reported series of fatal cases, all showing symptoms and lesions which are now recognized as typical of the condition. A number of these deaths occurred after only twenty or thirty minutes of anesthesia, untoward symptoms developing a few hours to a few days after the administration. The symptoms include progressive weakness, pallor or cyanosis, restlessness, vomiting, delirium, convulsions, stupor, coma and death. The organs principally affected are the liver and kidneys. The former is yellow and fatty, with hemorrhages often under the capsule and throughout its substance. The typical picture is that of a central necrosis (Figure 6). The cells about the central vein disappear, leaving only a mass of granular material which shows neither nuclei nor cell outline. Nearer the periphery of the lobule is a zone of swollen cells, which have undergone hyaline and fatty degeneration. A few normal liver cells may remain at the periphery. The kidneys are swollen, markedly congested, with occasional hemorrhages under the capsule, about the tubules, and in the pelvis. The cortex is thickened, the markings indistinct. Micrscopically the cells of the tubules are greatly swollen, granular, and loaded with fat. The lumen is filled with granular material, fat globules and coagulated serum. The heart muscle often shows some fatty degeneration. The changes are generally considered to be more profound in the liver, though some observers have found the kidney degeneration even more marked.

The reports of these cases of delayed chloroform poisoning with their pathologic findings led naturally to a study of the lesions produced by chloroform anesthesia. Many animals were used in these experiments,

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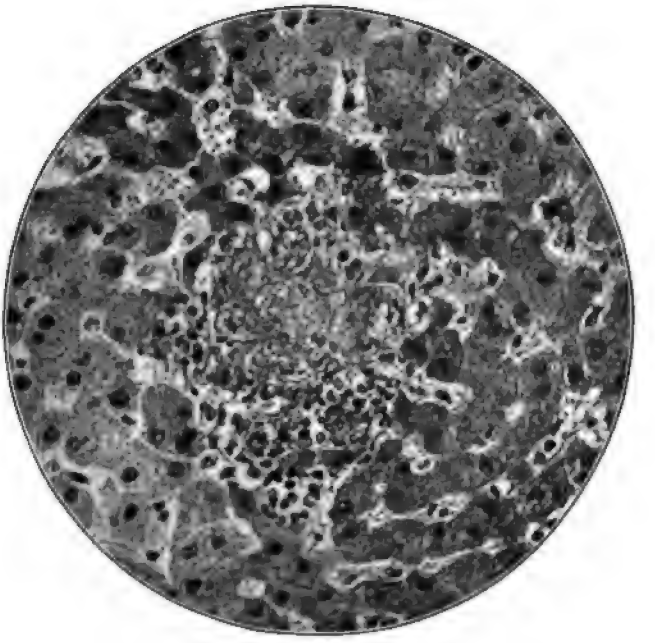

Fig. 5.—Liver of eclampsia, with hemorrhage.

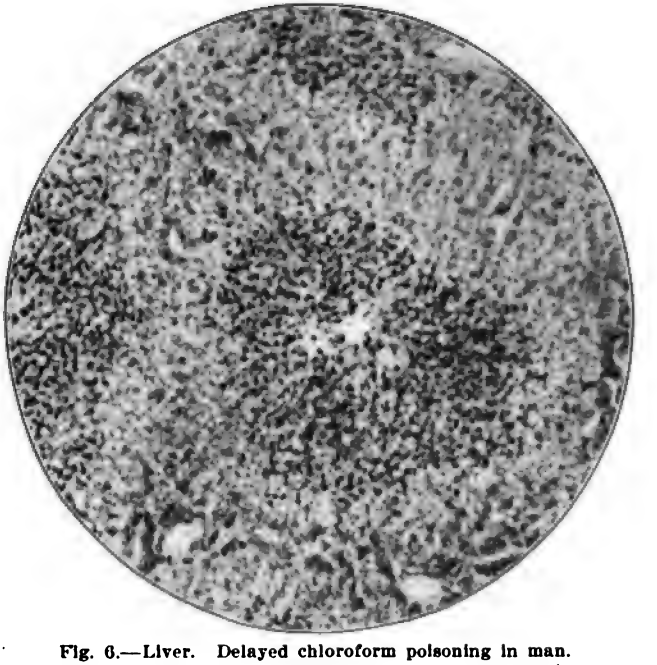

Fig. 6.—Liver. Delayed chloroform poisoning in man.

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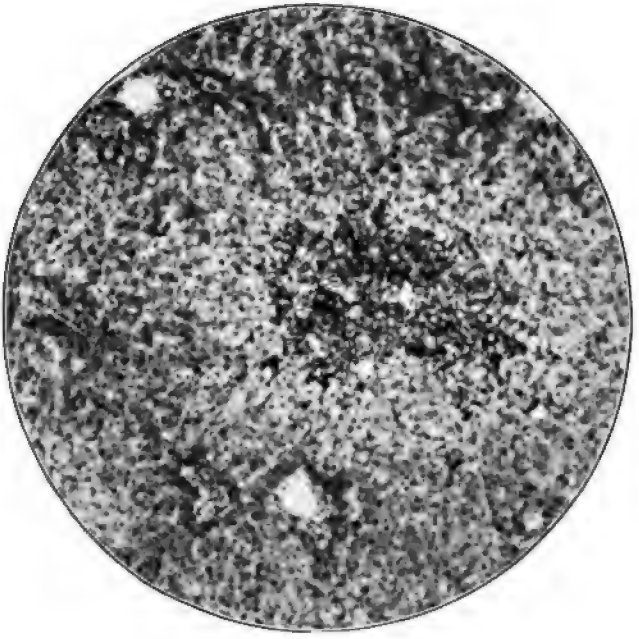

Fig. 7.—Liver of dog. One hour chloroform anesthesia.

Fig. 8.—Liver of dog. Delayed poisoning after eight and one-half hours' chloroform anesthesia.

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Fig. 9.—Kidney of dog. Delayed poisoning, after seven and one-half hours chloroform anesthesia.

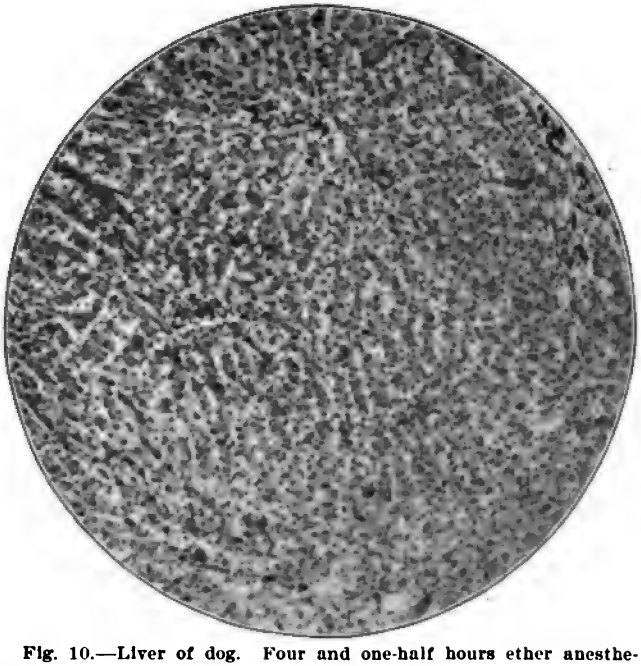

Fig. 10.—Liver of dog. Four and one-half hours ether anesthesia.

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Fig. 11.—Kidney of dog. Five hours ether anesthesia.

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most often dogs, rabbits and guinea-pigs. These studies were exhaustive and include the work of Lengemann, Osterhag, Stiles and McDonald, Stassman and others, together with the more recent work of Howland and Whipple. The most striking result of these studies was the extent of the degeneration and necrosis found in the liver and kidney after chloroform anesthesia of a short duration.

It has been found that characteristic lesions are regularly produced, varying in degree with the duration and depth of anesthesia and also with idiosyncrasy. Thus after thirty minutes to one hour anesthesia with chloroform, the centers of the lobules of the liver show congestion with granular and fatty degeneration, the innermost cells being necrotic, their nuclei not taking the stain and the protoplasm being deeply stained pink with eosin (Figure 7). With more prolonged action the changes approach those found in delayed chloroform poisoning in man. The liver appears yellow and fatty with scattered hemorrhages. The cells about the centers of the lobules are entirely necrotic, a granular mass remaining. Outside of this is an area of cells which have undergone hyaline and fatty degeneration, with normal cells at the periphery. In some cases the liver cells have almost entirely disappeared with only a few scattered living cells in the portal spaces (Figure 8). In the kidney, chloroform anesthesia causes a marked congestion with a cloudy swelling and occasionally hemorrhages into the parenchyma. The cells of the tubules are swollen and granular, occluding most of the lumen; in other places they have disappeared entirely. Fatty degeneration is present and in many cases pronounced (Figure 9). The heart muscle may be pale and show fat droplets in its fibers. Hemorrhages occur throughout the body, particularly in the serous membranes, and in the intestinal and stomach mucosa.

Howland and others were able almost at will, by continuing the anesthesia to produce delayed chloroform

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poisoning in dogs, with symptoms and lesions corresponding in detail with those of delayed chloroform poisoning in man. Thus we find in these three conditions, eclampsia, delayed chloroform poisoning in man and chloroform anesthesia in animals, many similarities. Pathologically there is central necrosis, parenchymatous and fatty degeneration in the liver; congestion, parenchymatous and fatty degeneration in the tubules of the kidney and a tendency to hemorrhages throughout the body. Clinically in delayed chloroform poisoning and in eclampsia there are vomiting, jaundice, delirium, convulsions and coma. With these facts before us, showing that chloroform acts as a poison to the liver and kidney, it certainly seems that its use in toxemia of pregnancy and eclampsia would still further impair these organs already damaged.

In turning to ether as a substitute, the question naturally arises, Does ether produce lesions in the liver and kidney similar to chloroform? Some work has already been done along this line, notably by Bandler, Lengeman and Leppmann, and it was partly to confirm scattered observatons on this subject that a further study of ether anesthesia was undertaken.

In our experiments six mongrel dogs of medium size were given ether by inhalation from an open cone. They were killed with ether forty-eight hours after the last anesthesia and autopsied at once.

Tissues were fixed with Müller's fluid and 10 per cent. liquor formaldehydi equal parts, and stained with hematoxylin and eosin. Fat was stained with Altman's fluid, Scharlach R. as control. Sufficient ether was given to produce complete muscular relaxation with loss of corneal reflex.

Dog 1. Given ether for 3 successive hours.

Dogs 2 and 3. Given ether 2 hours each on 2 successive days.

Dog 4. Given ether for 2½ hours on 2 successive days.

Dog 5. Given ether for 3 hours on 2 successive days.

Dog 6. Given ether for 2½ hours on 3 successive days.

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With Dogs 3, 4 and 6 a section of liver and kidney was taken at the beginning of the first anesthesia for control. The dogs all took the anesthesia well and appeared bright and active throughout the experiments with the exception of Dog 3. This dog required artificial respiration twice, had a slight cough on the first day, which became more marked on the following days. It showed no pneumonia on autopsy.

In none of these animals could any necrosis in any of the parenchyma be found. In the lungs occasional small areas of a deeper red than the surrounding substance, containing an increase in amount of blood on section, showed congestion. The heart muscle in each dog was found to be of normal color, striations distinct, no apparent increase in fat.

There were no hemorrhages in the mucosa of the stomach and intestines.

The livers were of a good color throughout, the vessels in a few places standing out a brighter red than the surrounding structure. The yellow appearance was entirely lacking, the cells throughout preserved their outlines with contents intact (Fig. 10). There was no suggestion of necrosis at any point. The protoplasm was somewhat granular and small droplets of fat were found in the cells about the central veins and in the portal spaces. This fat was only slightly in excess of that in the controls.

The kidneys were of normal size, capsule not adherent, cortex not thickened, markings distinct. Microscopically the cells of the tubules were well preserved throughout; their outlines were distinct, the nuclei staining sharply, the protoplasm granular, the tubules containing in some places some granular material. Fat globules were present in a few of the straight tubules and in the lining cells. This condition seemed no more than is normally found and no more marked than in the controls taken. The condition is well shown in Figure 11.

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No pathologic changes could be found in any of the sections of pancreas and spleen. These facts seem to demonstrate that in animals, at least, ether produces practically little effect on the liver and kidney as compared with the very marked changes in these organs produced by chloroform, and, while it may be argued that this comparison has been demonstrated only in animals, the similarity between the lesions of delayed chloroform poisoning in man and chloroform anesthesia in animals makes it appear more than probable that reasoning as to the effect of ether on the liver and kidney of man, from the lesions produced by ether in animals, is entirely justified.

Impressed with the above facts, one of us in his service at the Sloane Maternity Hospital has abandoned entirely the use of chloroform during the past year, in all cases of toxemia of pregnancy or eclampsia, either for operative procedure or for the control of convulsions, and has employed ether in these conditions whenever an anesthetic was required.

During this period, aside from numerous cases of toxemia, there have been 20 cases of true eclampsia, *i. e.*, toxemia with convulsions varying in unmber from one to thirty-one. In the treatment of these patients no attempt has been made to control the convulsions by means of the anesthetic. This end has been sought through lowering the blood-pressure and quieting the nervous system by the use of veratrum, chloral and nitroglycerin. Ether has been used whenever an anesthetic has been required during the delivery. Former experiences with attempts to control the convulsions by chloroform proved that it was practically impossible. Recent experiences without attempts to control the convulsions by an anesthetic have given results which compare favorably with those of former methods. Of these twenty patients only one died, and she was practically moribund when brought to the hospital, with jaundice, vomiting, scanty and bloody urine and with the liver necrotic.

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This gives a mortality of 5 per cent. In the last twenty cases of eclampsia in which chloroform was used there were five deaths, a mortality of 25 per cent.

In a series of 20,000 deliveries previous to this last year there were 251 cases of eclampsia, with a mortality of 71, i. e., 28 per cent.

It may be asked whether or not the twenty patients in the recent series were as seriously ill as those of the previous series. Not only did it seem to us that they were as seriously ill at the beginning of treatment, one of the nineteen who recovered having thirty-one convulsions, but it also seemed that others having toxemia were perhaps spared eclamptic seizures by the avoidance of the use of chloroform in this condition. It is freely admitted that a series of only twenty cases of eclampsia is a small number from which to draw positive conclusions, but the marked effect of chloroform on the organs usually involved in eclampsia and the slight effect of ether on these organs makes the use of chloroform in this condition seem irrational and the use of ether rational.

For the loan of the specimens from which the photographs of Figures 7, 8 and 9 were taken we are indebted to Dr. John Howland of New York.

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THE INDICATIONS FOR AND TECHNIC OF VAGINAL CESAREAN SECTION IN ECLAMPSIA

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It was my original intention to prepare for this session a paper on the different methods of rapid evacuation of the uterus in the various toxemias of pregnancy. The invitation to participate in this symposium on eclampsia has modified my plan and I shall confine my remarks to the indications and technic of vaginal Cesarean section in eclampsia.

INDICATIONS

Vaginal Cesarean section or vaginal hysterotomy, the incision of the pregnant uterus through the vagina, is indicated in eclampsia when, in the presence of a rigid cervix, the uterus has to be rapidly emptied. It would seem as if these indications were simple enough. When the cervix is easily dilated or when there is no need for haste, other methods of emptying the uterus may be employed. When a multipara is threatened with eclampsia and the condition of the patient does not demand haste, slower methods of emptying the uterus, such as the balloon, gauze packing or manual dilatation, may be employed. But when the cervix is rigid and haste is necessary, vaginal Cesarean section is much quicker and is the method of choice.

My position in regard to vaginal Cesarean section has been misunderstood, judging from the protests which

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have been raised against my contention that under certain conditions the operation should be performed by the general practitioner. But careful consideration will show, I believe, that my position is correct. My claim is that in the past the practitioner has been taught to perform and expected to do any obstetric procedure which stopped short of using the knife. He was taught, for example, the indications and contraindications of high forceps, an operation calling for far more judgment and skill than vaginal Cesarean section. He was taught and has practiced for years the difficult and slow manual dilatation of the parturient os, with all its attendant danger of laceration of the cervix, as well as sepsis from the carrying upward of septic material from below. Yet the minute the practitioner is advised in the presence of a rigid cervix which will not yield to manual dilatation, when haste is imperative, to perform a clean surgical operation requiring the use of the knife, the wise ones shake their heads and speculate as to the harm that will result from such operations in unskilled hands. What operative procedure, may I ask, has not resulted in harm in certain hands, and, I may add, sometimes in supposedly skilled hands? It is not my purpose to advocate indiscriminate operating by anybody and everybody. Undoubtedly it would be better if surgery of every description could be limited to a select few in each community. Then the inexperienced operator would be heard of no more. The man who aspired to be one of those to perform surgery in a certain district would prepare himself by years of hospital work, serving a long apprenticeship under some older surgeon. Then this specialist would be ready to respond to the call of every practitioner and perform all his operations for him, obstetric as well as others. No doubt this would be an ideal condition of affairs, especially for the surgeon. But it needs no great argument to convince us that in this country, at least, such an ideal situation will not

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materialize in our lifetime. Even in the cities, where now it would be possible for such a condition of affairs to exist, the practitioner still persists in performing his obstetric surgery. In fact, it is about the only surgery in this age of specialism that has been left to him, or that he contends should remain his.

I am not referring to the city practitioner with the special obstetric surgeon within easy call. I am making a plea for the country practitioner, who must do the best he can, with the aid perhaps of a fellow practitioner no more skilled than himself. My contention is that less harm will be done when it becomes necessary to empty the uterus in eclampsia in the presence of a rigid cervix, by a clean-cut surgical procedure like vaginal Cesarean section, than by manual dilatation, the operation usually selected under these conditions.

My friend, Dr. Philander Harris, the originator of the only true scientific method of manual dilatation, a man of great gynecologic and obstetric experience, is able to accomplish dilatation in three-quarters of an hour even in difficult cases. Yet even he can not be entirely satisfied with the method, for recently he has brought forward a modification of Bossi's instrument, in which a powerful mechanical force takes the place of the fingers.

It is not a question of an hour's time in these difficult cases in which the cervix is rigid. The practitioner employs one hand until it is numb and useless. Then the other is substituted, each hand being inserted into the vagina and up to the cervix many times before dilatation is accomplished. Such manipulation means sepsis or a great chance of septic infection in every such operation. It is not uncommon for a physician to relate the history of a difficult case of eclampsia in which it required three or more hours before the cervix could be dilated, the patient being under the anesthetic all this time. For my part I cannot see why obstetric surgery should not be as well done and according to as sound principles as

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Fig. 1.—Vaginal orifice and vagina dilated with the gloved hand, held in the shape of a cone.

Fig. 2.—Cervix drawn forcibly downward by volsella forceps. Transverse incision through mucosa at vaginal juncture.

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materialize in our lifetime. Even in the cities, where now it would be possible for such a condition of affairs to exist, the practitioner still persists in performing his obstetric surgery. In fact, it is about the only surgery in this age of specialism that has been left to him, or that he contends should remain his.

I am not referring to the city practitioner with the special obstetric surgeon within easy call. I am making a plea for the country practitioner, who must do the best he can, with the aid perhaps of a fellow practitioner no more skilled than himself. My contention is that less harm will be done when it becomes necessary to empty the uterus in eclampsia in the presence of a rigid cervix, by a clean-cut surgical procedure like vaginal Cesarean section, than by manual dilatation, the operation usually selected under these conditions.

My friend, Dr. Philander Harris, the originator of the only true scientific method of manual dilatation, a man of great gynecologic and obstetric experience, is able to accomplish dilatation in three-quarters of an hour even in difficult cases. Yet even he can not be entirely satisfied with the method, for reecntly he has brought forward a modification of Bossi's instrument, in which a powerful mechanical force takes the place of the fingers.

It is not a question of an hour's time in these difficult cases in which the cervix is rigid. The practitioner employs one hand until it is numb and useless. Then the other is substituted, each hand being inserted into the vagina and up to the cervix many times before dilatation is accomplished. Such manipulation means sepsis or a great chance of septic infection in every such operation. It is not uncommon for a physician to relate the history of a difficult case of eclampsia in which it required three or more hours before the cervix could be dilated, the patient being under the anesthetic all this time. For my part I cannot see why obstetric surgery should not be as well done and according to as sound principles as

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Fig. 1.—Vaginal orifice and vagina dilated with the gloved hand, held in the shape of a cone.

Fig. 2.—Cervix drawn forcibly downward by volsella forceps. Transverse incision through mucosa at vaginal juncture.

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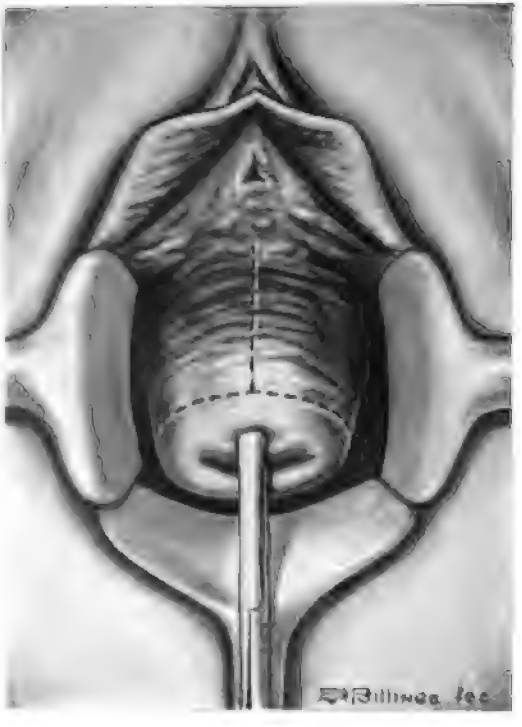

Fig. 3.—Additional longitudinal incision at times necessary to secure more room.

Fig. 4.—Vaginal and bladder walls dissected away from uterus by downward and upward strokes with sponge.

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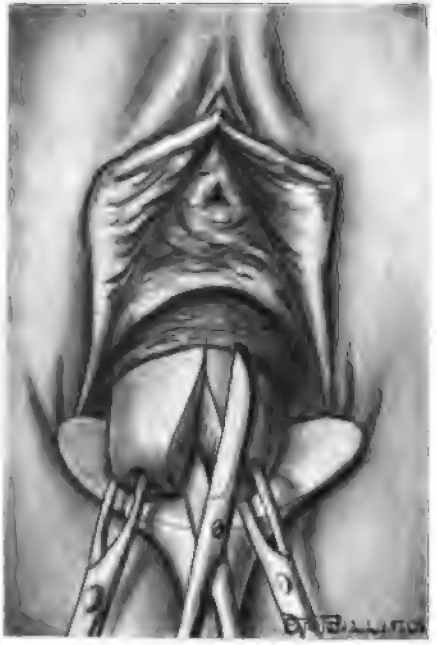

Fig. 5.—Cervix grasped at each side of median line by volsella forceps. Cervix split upward for about 9 cm. in median line by stout scissors, care being taken not to distort cervix.

Fig. 6.—Bladder held away by retractor. Uterus split upward in median line. Scissors guided by fingers so as not to puncture bag of membranes.

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Fig. 7.—Transverse incision through posterior vaginal mucosa preparatory to splitting posterior cervical lip in median line. Through transverse incision rectum and peritoneum are pushed away from uterus by sponge.

Fig. 8.—Anterior and posterior uterine walls incised. Intact bag of membranes protruding.

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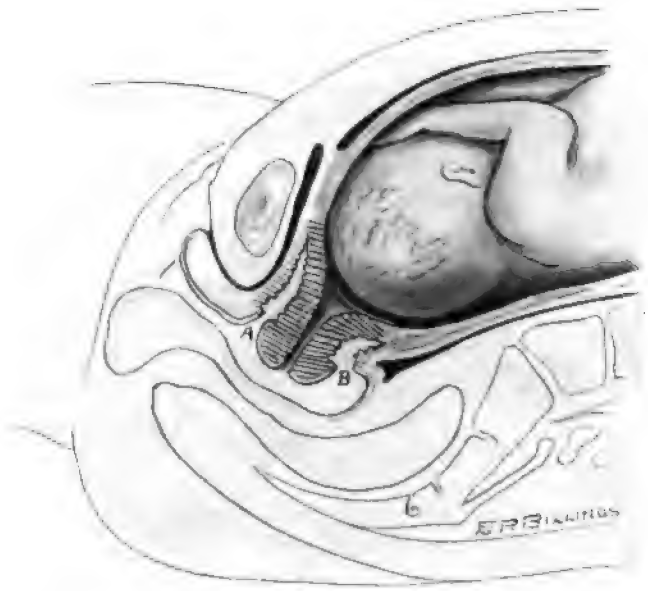

Fig. 9.—Cut showing extent to which anterior and posterior uterine walls can be incised. Peritoneum not opened. Ample space for passage of child.

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Fig. 10.—Showing forceps introduced through incision. In most cases version preferable to forceps. Volsella forceps should be removed from cervix before application of forceps or version.

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Fig. 11.—Posterior incision closed by continuous chromicised catgut introduced from posterior surface down to but not through cervical mucosa. Anterior incision being sutured and upper portion of incision being drawn down to facilitate introduction of suture.

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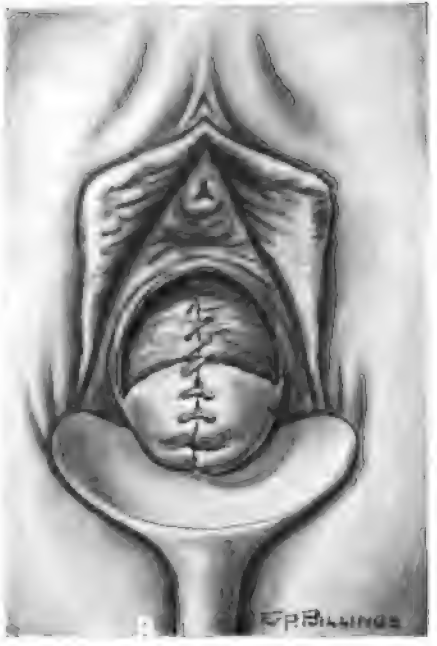

Fig. 12.—Suture of anterior and posterior incisions completed.

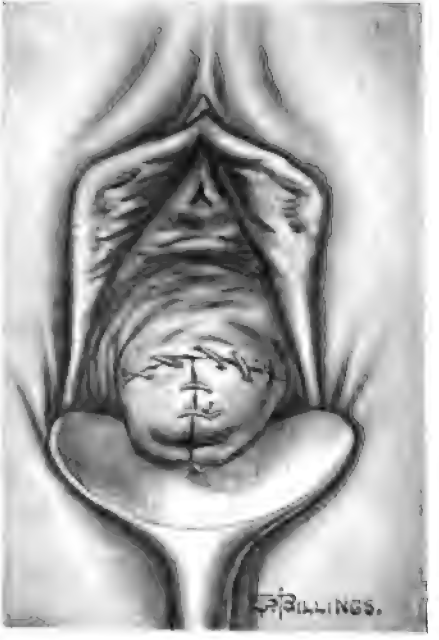

Fig. 13.—Vaginal mucosa united by continuous catgut suture which should not be too tight for fear of oozing under flap. In some cases cigarette gauze drain can be placed temporarily at one angle of wound.

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other kinds of surgery. If practitioners are not familiar with the technic of this operation it is not an impossible task for them to acquire it.

THE TECHNIC

One assistant, besides the anesthetizer, is all that is absolutely necessary, although it is more convenient for the operator to have an assistant at each leg of the patient. If only one assistant can be secured the patient's legs can be held in the lithotomy position by an ordinary obstetric leg-holder, or a sheet passed under the popliteal spaces and over one shoulder and under the other.

The vulva and vagina should be prepared as for any other obstetric operation, and the bladder carefully emptied. With the gloved hand, held in the shape of a cone, the vaginal orifice and the vaginal canal should now be completely dilated, in the same manner but more thoroughly than is customary when the hand is introduced for the operation of manual dilatation (Fig. 1). It may be necessary with very small vaginas to employ the lateral incisions advocated by Schuchardt, but they are unnecessary in the large majority of cases, ample dilatation being secured through the use of the hand—dilator as described above. However, it is essential that ample dilatation be secured, else the on-coming or after-coming head may either be arrested at the outlet or, if force be employed, tears of the perineum may result.

The perineum being depressed, the anterior lip of the cervix is seized and drawn downward to the vulva. Usually this is easily accomplished, so that the anterior vaginal wall, the field of operation, is within easy reach. When, for any reason, the cervix cannot be so drawn down, the operation is contraindicated, as it is quite essential that the anterior and posterior incisions be made aided by sight. A transverse incision long enough to take in nearly one-half the circumference of the cervix is now made through the vaginal mucosa at the vaginal

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juncture (Fig. 2). At times, with a small cervix, it may be necessary to add a longitudinal cut through the vaginal mucosa, thereby making an inverted T-shaped incision (Fig. 3). Usually the first incision is sufficient to allow the pushing upward of the vaginal and bladder walls by a few strokes of the sponge (Fig. 4). Pressure must be downward toward the uterus, at the same time upward; otherwise the bladder may be opened. On account of the vascularity of the tissues due to the pregnant state, no difficulty is experienced in separating the bladder, the tissues acting in a manner entirely differently from their behavior in the case of the non-pregnant uterus. If for any reason there be difficulty in pushing up the anterior wall, instead of using force, the tissues next to the cervix should be snipped with the scissors.

A retractor is next inserted between the uterus and bladder and pulled sharply upward, thus holding the bladder out of harm's way. Or the bladder can be forced upward against the pubes and held there by a small sponge. A volsella forceps is then placed at either side of the external os and the cervix and lower uterine segment split upward in the median line by stout scissors for about nine centimeters (Fig. 5). Care should be taken not to distort the cervix so that the incision can be made exactly in the median line, in which case there will be little or no hemorrhage. Also, if the point of the scissors be guided by the fingers, the cervix can be cut without rupturing the membranes, a desirable thing, as usually the operation is completed by version (Fig. 6).

In case the operation is performed from the beginning of the ninth month to term, on account of the relatively large size of the child's head it is best to incise the posterior cervical lip as well. Otherwise, while there may be room enough for the passage of the hand upward where the anterior lip alone has been excised, there may not be room enough for the passage of the after-coming head, and a tear of the uterus may result; or there may

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be so much delay as to endanger the life of the child. A transverse incision about six or seven centimeters in length is made through the mucosa at the posterior vaginal juncture and the rectum and peritoneum pushed away by a sponge (Fig. 7). The posterior lip is then incised in the median line in the same manner as was the anterior lip and for about the same distance.

The split cervix is now exposed, as shown in Figure 8. If care has been taken the unbroken bag of membranes will be seen protruding through the opening.

The extent of the anterior and posterior incisions and the space obtained for the passage of the child is illustrated by Figure 9.

The extraction of the child may be by forceps (Fig. 10) or by version. Usually the latter is preferable when haste is desirable. However, the forceps should always be at hand in case there be difficulty in extracting the after-coming head, delivery being easily accomplished by flexing the head over the perineum by means of the forceps. After the incisions have been made, and prior to the extraction of the child, the volsella forceps should be removed from the cervix, else the hand or the forceps, by pressure upward, may cause them to tear through the friable cervical tissues, thereby giving rise to ugly, ribbon-like tears.

The placenta can be removed manually or expressed by the Credé method. Usually there is no more bleeding than follows any operation which rapidly empties the uterus. Tamponade of the uterus is generally unnecessary, although it is indicated if there be postpartum hemorrhage.

The operation up to this point can be easily finished within ten minutes by one who has had experience with vaginal work, although this rapidity cannot be expected from inexperienced hands.

The incisions should be sutured with catgut, plain or chromicized, as one may prefer. To save time, contin-

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uous sutures should be employed, the needle going down to but not through the cervical mucosa (Fig. 11). When both anterior and posterior lips have been incised the latter should be sutured first (Fig. 11). Care should be taken to see that the upper point of the anterior incision is sutured; if necessary the uterine walls being pulled downward for this purpose by tenaculum forceps (Fig. 11), thus securing accurate coaptation of the cut cervical tissues (Fig. 12). Care should be taken not to suture too tightly the vaginal flap for fear of oozing and a collection beneath the flap (Fig. 13). In some cases it may be advisable to place a temporary gauze drain at one corner of and under the flap in order to secure drainage.

The after-treatment differs in no respect from an ordinary obstetric operative case. Vaginal douches are not necessary unless suppuration should occur. The cervical wounds usually heal and give very little trouble. A number of normal labors after this operation show that the cicatrices are strong enough to stand subsequent labor without rupture.

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VAGINAL CESAREAN SECTION

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The history of vaginal Cesarean section is recorded in the last decade of obstetric literature. To Dührесen belongs the credit of having introduced the operation to the notice of the profession, while he and his German confrères have done much to elucidate the indications and technic of the operation. The result secured by them in the treatment of eclampsia by vaginal Cesarean section has reduced the maternal death-rate to a lower figure than that obtained by any other line of treatment. Fully nine-tenths of the literature on the subject is published in the German language. The United States comes second. A few articles are found in the French, Spanish and Italian languages.

In 1903 J. M. M. Kerr[1] published a report of a case of vaginal Cesarean section. Impressed with the value of the operation in the treatment of eclampsia, N. T. Brewis determined to employ the method in the next suitable case, and three years later reported to the same society six operations.

NOT IN GENERAL FAVOR

Stamm, of Fremont, Ohio, was the first to bring it to the attention of the profession in this country. Since then papers have been published by sixteen authors in the United States, who, with one or two exceptions, have endorsed the operation and recognized its value. In

1. Kerr, J. M. M.: Tr. Edinb. Obst. Soc., 1903.

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the discussions that have occurred on these various papers in our medical societies the general tone of debate has been against the operation. As a rule one will notice that the objections are based on theoretical grounds and the objectors have had little or no experience with the operation. In spite of opposition, however, favorable reports continue to appear and new advocates of the operation recognize and advise its performance. Palmer Findley prophesies it will remain in general favor only with a few obstetricians and that, in the light of reported cases, the scope of the operation will be limited and vaginal Cesarean section will be little practiced.

He compares vaginal Cesarean section unfavorably with abdominal Cesarean section in eclampsia, on the ground that the latter is time-saving and the dangers less to the infant. The saving of time is questionable. It may take two or three minutes more to deliver the infant by vaginal Cesarean section, but the completion of the operation can usually be accomplished as soon as or more quickly than abdominal Cesarean section. When the mother is suffering from eclampsia the infant is already toxemic and generally is born dead, or dies soon after delivery. The difference of a few minutes in favor of delivery by abdominal Cesarean section will change the result for the infant too little to counterbalance the increased maternal mortality of the latter operation. The shock of abdominal Cesarean section added to the dangers of the operation on toxemic patients will give a higher maternal death-rate than when performed for other indications. Consequently we should not consider the favorable maternal death-rate of abdominal Cesarean section performed for different conditions as applicable to the situation presented when the mother is suffering from eclampsia. Edgar and Hirst quote the statistics of Charpentier for abdominal Cesarean section performed for eclampsia with a maternal mortality of 36.26 per cent. Hillman collected data on

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40 operations with a mortality of 50 per cent. for the mothers and 45 per cent. for the infants. Olshausen has a mortality of 33.3 per cent.

INDICATIONS FOR THE OPERATION

The indications for vaginal Cesarean section presupposes a rigid os and undilatable cervix, and it is a valuable operation under the circumstances when the conditions point to the rapid evacuation of the pregnant uterus in the later half of gestation. Exceptionally it may be called for before that period, but it then is performed in the interest of the mother alone. The prompt termination of pregnancy may be required in the interest of the mother, or of the infant, or of both. The life of the unborn infant is so dependent on the welfare of the mother that disease compromising her life is liable to destroy the former. When toxemia has reached a degree that endangers the mother's life the same intoxication threatens to destroy the infant; when the loss of blood from accidental hemorrhage, or when advanced organic disease of the heart, with failure of compensation, threatens the life of the mother primarily it jeopardizes that of the offspring secondarily. Labor complicated by an undilatable condition of the os and cervix, physiologic or pathologic, endangers the infant primarily and the mother secondarily. Labor complicated by prolapse of the funis through a cervical canal unprepared for prompt dilatation compromises the safety of the infant and not that of the mother.

The indications under consideration for the employment of vaginal Cesarean section are restricted to its use in the treatment of eclampsia. These indications are viewed from the standpoint of the obstetrician and of the obstetric surgeon. Two years ago I read a paper in Chicago, before this Section of the American Medical Association, in which I presented my reasons for advocating prompt delivery in the treatment of eclampsia. This phase of the subject is presented to you to-day by

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other participants in the symposium, so my line of thought will take up for consideration the indications for vaginal Cesarean section from the standpoint of the obstetric surgeon.

To accomplish rapid evacuation of the pregnant uterus in the latter months, or at the expiration, of gestation we must recognize two important, cardinal steps in the operation: first, the dilatation of the cervix; second, the delivery of the infant.

The methods of delivery of the infant, whether by forceps or version, belong to the domain of the obstetrician. The consideration of the indications for vaginal Cesarean section from the standpoint of the obstetric surgeon presupposes that we have to deal with an intact and undilatable cervix. The cases are represented usually by primiparæ in the latter months of pregnancy and constitute that difficult class of patients in whom the obstetrician recognizes the complications to be met in the quick artificial dilatation of the cervix. Before considering artificial methods of rapid dilatation let us study briefly the natural method.

NATURAL METHOD OF CERVICAL DILATATION

Nature has one way to accomplish this purpose, and it is not done rapidly, but slowly, gradually, gently and without danger to the integrity of the soft parts. The intermittent force of the uterine contractions drives the bag of water against the point of least resistance, the center of the lower segment of the uterus represented by the internal os. Hydrostatic pressure from above, aided by the antagonistic action of the uterosacral and uterovesical ligaments, exerted antero-posteriorly constitute the dilating mechanical forces.

Physiologic changes of great importance are the progressive thinning of the lower segment and the softening and dilatability of the tissues produced by engorgement of the pelvic blood-vesssels and the transudation of serum between the muscular fibers of the lower

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segment of the uterus and cervix. As resistance to the dilating forces is diminished the internal os opens wider; the cervix is effaced; the external os is dilated, and finally the canalization of the cervix is completed. Dilatation begins by obliteration of the canal from above downward. A funnel-shaped depression beginning at the site of the internal os increases in diameter and depth until the cervix has disappeared and the uterine cavity is separated from the vagina only by the external os.

ARTIFICIAL METHODS OF CERVICAL DILATATION

No method of artificial dilatation can be instituted that will meet the conditions mentioned in the natural method. Formerly manual dilatation was the only resource of the obstetrician and the result could not be accomplished by this method gradually, gently and without danger to the integrity of the soft parts. The very first requirement *viz.*, that of quick dilatation in the treatment of eclampsia is contrary to the laws of nature; but these must be sacrificed. Dilatation by the manual method cannot be accomplished quickly in these cases, as its advocates admit that from forty minutes to an hour or longer is necessary to accomplish the purpose.

The Bossi dilator was introduced because the force obtained by the hand was insufficient. By the aid of this powerful instrumental dilator time is saved and the canal is quickly opened. Not only is the integrity of the soft parts endangered by the forcible manual or instrumental dilatation of unprepared tissue, but the life of the eclamptic patient is further jeopardized. The unfavorable results of *accouchement forcé* in the treatment of eclampsia are largely due to the aggravation of the disease by the reflex influence of forcible stretching of the cervix.

We must admit that every effort to effect quick dilatation and the termination of pregnancy opposes the laws of Nature. But disease is opposition to those laws

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and we must fight eclampsia by illegitimate means. These means are, first, the termination of pregnancy which is furnishing the source of the toxemia; second, the rapid dilatation of the cervical canal; third, the rapid extraction of the infant. The prompt termination of the first stage of labor is the principal difficulty to be overcome, and we have seen that manual and instrumental dilatation are objectionable.

How then can we quickly dilate an intact, unprepared cervix without subjecting the patient to the injurious influences of forced mechanical stretching? Manual and instrumental dilatation will not accomplish that result. Vaginal Cesarean section fulfils the indications better than any other method. The unprepared tissues are cut and the wound opened without danger to the integrity of the soft parts. The cervical canal is dilated without forcible stretching and the eclamptic patient is saved from injurious reflex disturbances. A clean-cut surgical wound is left to be repaired instead of bruised and torn tissues.

THE VALUE OF VAGINAL CESAREAN SECTION

The objections raised against the operation are largely preventable and due to faulty technic. Sepsis, injury to the bladder, opening the peritoneal cavity anteriorly or posteriorly, extension of the incision by tearing, and hemorrhage cannot be placed to the discredit of the operation, but to that of the operator. The danger of infection is no greater in this operation than in any other performed on the birth canal of the pregnant woman, and no greater than that met with in forcible manual and instrumental dilatation.

Injury to the bladder can be avoided by careful separation of the organ from the cervix. The connective tissue binding the bladder to the cervix is softened and loosely attached during the latter months of pregnancy except in the median line. The closer attachment in the median line is the uterovesical ligament. By cutting

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this central attachment and carefully working beneath the tissue and close to the cervix, danger of injury to the viscus is obviated.

Opening the peritoneal cavity in front or behind can result only from the careless extension of the incision beyond the needs of the case. Extension of the incision by tearing is due to one of two causes: either the incision is not carried up through the internal os and the wound opened sufficiently before delivery by forceps or version, or the extraction of a large infant at or about full term with only the anterior incision of the cervix, which alone is sufficient in premature cases.

Very little hemorrhage follows the separation of the bladder and still less from the incisions of the cervical tissue. Post-partum hemorrhage is prevented or controlled by the hot sterile douche and gauze tamponade of the uterine cavity. I have experienced one complication of the operation not heretofore mentioned. I performed vaginal Cesarean section on a primipara at the thirty-fourth week of gestation. Active treatment for pre-eclamptic toxemia had been instituted for eight days when the patient was seized with a convulsion. She was immediately removed to the operating-room and vaginal Cesarean section was performed, the anterior incision of the cervix only being required. The infant was born alive and lived three months. The mother remained in coma for ten hours and afterward was making a satisfactory convalescence when, on the seventh day, she had a most severe secondary hemorrhage. A large quantity of coagulated blood was removed from between the bladder and cervix and the cavity irrigated with hot sterile salt solution and packed with gauze. No fever followed and healing of the surfaces was complete. Objections to vaginal Cesarean section on the ground that rupture of the uterus may occur in subsequent labor conjure up an imaginary danger that has never been realized yet.

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WHO SHOULD OPERATE?

By whom should vaginal Cesarean section be performed? I am led to take cognizance of this question because advice has been given that the general practitioner should be familiarized with the technic of the operation and be taught to perform it when necessary. It goes without saying that no one should attempt the operation without being familiar with the technic, and yet in this day of brilliant surgery the temptation is so great that "fools rush in where angels fear to tread." It needs little or no encouragement to transport the twentieth century physician from his graduating exercises to the operating-room. Men who practice general medicine and use the pen more than the knife are only too prone to undertake all manner of surgical work. I have been informed of four or five instances—and two of them came under my personal knowledge—of men who had attempted the operation and abandoned it because they were not familiar with the procedure. I recognize the fact that throughout the length and breadth of this great land of ours there are many self-reliant men, often indeed pioneers in surgical work, who are practicing the profession in sparsely settled country districts. Necessity makes them surgeons as well as physicians and against such men undertaking vaginal Cesarean section I raise no dissenting voice provided they have surgical skill and know how to do the operation. The difficulties of the operation are not great to any one who is familiar with the anatomy and surgery of the pelvic organs, but it should not be performed by the general practitioner unless he is experienced in surgery, otherwise more lives will be saved and less invalidism result by adhering to the older methods of treating eclampsia.

1909 Q Street, Northwest.

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THE SURGICAL TREATMENT OF ECLAMPSIA

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There seems, at this time, to be hardly any question but that women suffering from eclampsia do better if the uterus is emptied promptly on the appearance of convulsions. Carl Braun emphasized the fact that the convulsions ceased or became less severe after delivery. Dührssen showed that in 93.75 per cent., and Olshausen that in 85 per cent. such a result followed. Seitz, in a very large collection of statistics, proves it conclusively. If further proof were needed, Winter brought it, in 1909, at the congress in Budapest, where he showed that in twenty cases delivered before they had had six convulsions no deaths occurred and in thirty-two cases, only three women were lost, while by a waiting policy, the mortalities were much greater, as follows:

Eclamptics treated expectantly with spontaneous labor, 8; mortality, 40 per cent.

Eclamptics, with expectancy till os was fully dilated, 19; mortality, 30 per cent.

Eclamptics, with mild measures used for hastening labor, (metreurysis, incisions, etc.), 32; mortality, 25 per cent.

Eclamptics with vaginal Cesarean section, 34; mortality, 9 per cent.

Eclamptics with vaginal Cesarean section immediately after first attack, 22; mortality, 0 per cent.

Bossi dilator used, number not given; mortality, 36 per cent.

In the discussion which followed, Bossi reported 395 cases in which his instrument had been employed with a death-rate of only 9.45 per cent. In the Berlin Charité during the years from 1904 to 1909 the mortality of the cases delivered within the first six hours was only 3.8 per cent.

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I have always taken a skeptical stand as to the usefulness of statistics and usually discard them unless they cover a long period of time and comprise very large numbers. The individual opinion of those competent to judge is much more valuable. There seems to be a trend of the formerly most conservative obstetricians, toward a more and more early operative delivery. Jaggard taught the expectant or medical treatment and this, therefore, was my own practice for many years, but added experience has convinced me that the women do better if the uterus is emptied at once. The convulsions cease more often, or grow less violent, and at longer intervals, consciousness returns quicker and convalescence is sooner established. While no special record has been kept, it seems to me that the pathologic findings in the urine disappear earlier than with older methods of treatment. One of the strongest arguments for early delivery is the immense improvement of the child's chances for life, various statistics showing that twice, and even three times as many children are saved by early delivery. Much depends on the time in pregnancy of the outbreak of the convulsions and on the method of delivery.

THE PROBLEM TO BE MET

Since it is the best policy to empty the uterus early, a discussion of the treatment of eclampsia before delivery resolves itself into the consideration of the methods to be employed in individual cases. Since removal of the child is opposed mainly by the soft parts, the subject of treatment is narrowed down to a discussion of how best to prepare a way for the child through the cervix and vulva. The method of effecting delivery depends on the period of pregnancy, the environment of the patient, the state of the cervix, the skill of the operator, and the extraneous complications such as contracted pelvis, placenta prævia, heart disease, infection, etc.

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Before the seventh month, the fetus always dies, either during or soon after delivery, and it is, therefore, necessary only to obtain sufficient dilatation of the cervix for the performance of craniotomy and extraction. After the period of viability, one must try to save the infant also.

If the patient is in a well-equipped maternity hospital and a man capable of his task is at hand, immediate delivery is practiced, overcoming by operation, the resistance of the cervix and perineum. If the patient is in a private house, and the obstetrician is without skilled assistance, reliance must be placed on medical treatment and on less active surgical measures. Here, puncture of the membranes, the use of the colpeurynter, and, when the cervix is almost completely dilated, manual dilatation of the balance, with episiotomy and forceps delivery or version and extraction depending on the conditions.

THE CONDITION OF THE CERVIX

The state of the cervix is the all-governing condition so far as the choice of method of rapid delivery is concerned. If the cervix is fully dilated, or effaced and the os has a diameter of 8 cm. (about 3 in.) delivery may safely be effected at once by forceps if the head is engaged, by version and extraction if the head is movable above the inlet. In primiparæ, I prefer to force the head down into the pelvis and then apply forceps rather than do a version.

If the cervix is effaced, that is, shortened, or taken up, or obliterated, but the os not sufficiently dilated, one may easily procure sufficient enlargement of the opening by manual dilatation, or stretching the os by means of one of the mechanical dilators about which there was such a furore several years ago. Hydrostatic bags may also be used for this purpose or the thin partition between the uterus and the vagina may be incised. —Dührssen's incisions. Manual dilatation is the method of choice in this particular class of cases, then episiotomy

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(in primiparæ) to overcome the resistance of the perineum, followed by forceps delivery.

The greatest discussion has arisen as to how to deliver in those cases—and they are the most frequently met—in which the cervix is uneffaced, tightly closed, and not admitting even the tip of the finger. Manual dilatation, metreurysis, Dührssen's incisions, vaginal Cesarean section, abdominal Cesarean section, each has adherents. I have had experience with all these methods and in the following will give my own opinion of each.

MANUAL DILATATION

Manual dilatation of the closed cervix with delivery is an operation, which, in the olden time, was called *accouchement forcé*. It requires from one to three hours and is often painfully tiring to the fingers and hands. It is invariably attended by lacerations of the cervix, and these tears are often deep, sometimes even of the dignity of a rupture of the uterus, opening the peritoneal cavity, causing death, from hemorrhage or from sepsis. In multiparæ, the lacerations are usually somewhat less extensive. In all cases, the cervix is bruised and battered, and sepsis, even in the hands of the cleanest obstetrician is sometimes unavoidable.

Philander Harris and a few other authors, take a different view of this operation, but my own experience makes me oppose it, and in this, I am supported by all the German authorities. The latter demand the following prerequisites for the operation:

1. Cervix effaced.
2. Pelvis normal.
3. Child not too large.
4. Normal presentation, position and attitude, or one that can be produced.
5. Dilatable vagina.

In a few cases I found the parts so soft and dilatable that it was possible to stretch the uterus open sufficiently for safe delivery, but these are so rare as to be truly exceptional.

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METREURYSIS

By putting a colpeurynter in the lower uterine segment and exerting traction on it, two things are accomplished—uterine action is set up and strengthened and the cervix is mechanically dilated from above downward, the bag acting like a fluid wedge. In cases in which no urgency exists, metreurysis is the ideal method of opening the uterus, because it imitates most closely the natural process. In favorable cases, that is, soft cervix and large vagina (conditions rarely found in primiparæ) it is possible under anesthesia, to dilate the cervix completely in from one to two hours, but if the cervix is rigid, and tightly closed, an attempt to force it open by means of bags in this time would fail, if it did not rupture the uterus. Unfortunately rigid cervix is a frequent complication of eclampsia, since this condition is commoner in primiparæ and women of advanced years. Contraindications to metreurysis in eclampsia are, scars of the cervix, abnormal rigidity, complete closure of the cervix in a primipara, edema of the paracervical tissues, local infection, great urgency.

One may, in selected cases, procure partial opening of the womb with the bags, and then complete the dilatation by incisions or the vaginal Cesarean section. A word of warning to those using the bags for cervical dilatation. If too much water is put into them, or too much traction put on the tube, the uterus is stimulated to over-violent action and may rupture. This is especially likely to occur in placenta prævia. I use a large Voorhees bag in preference to all others.

INSTRUMENTAL DILATORS

Bossi introduced his branched dilator in 1887, but it received no general recognition until 1898 when Leopold, of Dresden, reported seventeen cases of eclampsia treated with it. It was then very extensively employed and many modifications of the instrument invented. Bossi used it when the cervix was closed, as did many

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others. Now, most authors have discarded it, and Bossi, himself, at the Budapest congress, said it should be used only when the cervix is effaced. Bossi reported 395 cases of eclampsia treated by rapid dilatation with a mortality of 9.45 per cent.

In a multiparæ, with a soft cervix, the instrumental dilator may occasionally accomplish the purpose without laceration or with negligible injuries. In other cases more or less deep tears are inevitable and the frequency of serious injury has relegated the instrument to a very subsidiary place. I would deny its usefulness in the class of cases under consideration and agree with Pfannenstiel that, in the clinic, the dilator is superfluous; in private practice, dangerous.

DÜHRSSEN'S INCISIONS

In the class of cases being discussed, the cervical incisions are contraindicated. Only when the cervix is effaced, shortened or fully taken up, when there is but a thin partition between the uterus and the vagina, are such incisions justifiable. Before this time, the large blood vessels have not yet been retracted upward out of reach of the cut, the peritoneum has not been pulled up, the connective tissue of the broad ligaments is still in the pelvis. If one cuts the thick cervix now, there is danger of severe, perhaps uncontrollable hemorrhage, the incision is easily torn into the peritoneal cavity, and further, the attempt to draw the fetus through the pelvis will disrupt the whole connective tissue framework of the pelvis. Dührssen's incisions are also contraindicated if the child is large or presents abnormally.

VAGINAL CESAREAN SECTION

As was indicated at the beginning of this paper, this operation has given the best results of any yet obtained, especially when it is performed immediately after the first convulsion. It is considered by Dr. H. D. Fry in one of the papers of this symposium.

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ABDOMINAL CESAREAN SECTION

This operation, proposed by Halbertsma in 1889, has not obtained the recognition it deserves. The statistics collected showing 30 to 60 per cent. maternal mortality, surely give too dark a picture, for it must be remembered that only the worst cases are submitted to the operation. Newell condemns the section, but Olshausen recommends it. It saves more infants than any other method of delivery, and is to be preferred when these complications coexist: contracted pelvis, placenta prævia, marked edema of the vulva, vagina and parametrium, scars or extreme rigidity of the cervix and perineum, unusual brittleness of the cervix, enormous varicosities of the genitals, large child, abnormal presentation. In the latter cases, the vaginal section often meets with insurmountable difficulties. A less skillful operator may be able to do the classical section when he would hesitate to operate from below.

With the extra-peritoneal Cesarean section, a resurrection of the laparo-elytrotomy of the last century, I have had no experience, but am inclined to believe that the advantages claimed for it are somewhat overdrawn. The technic is more difficult than that of the classical section; hemorrhage from the incision is sometimes dangerous; the Trendelenburg posture is needed and this increases the danger of air embolism and cerebral thrombosis already exaggerated in eclampsia; extraction of the child is harder and is oftener fatal to the infant; in 21 per cent. of the 65 cases reported by Pfannenstiel, Latzko and Fraipont the peritoneal cavity was opened, and in three, the bladder was injured; sometimes the bladder cannot be safely removed from the uterus and the transperitoneal route must be taken; the labor must have progressed till the uterus has drawn the peritoneum upward and unfolded the anterior plica—this is impossible in eclampsia, which demands instant delivery; the danger of infection of the immense connective tissue spaces is probably as great as that of the peritoneum,

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at least suppuration has been frequently reported (Rubeska, Franz), and hernia is just as possible, Franz having already found one with the bladder and another with the cervix in it; the danger of rupture of the uterus in subsequent labor is greater than with the classic operation because the scar is in the thinned dilated portion, and further, a second Cesarean section would be very difficult through the scarred cavity of Retzius; Latzko collected 137 cases which showed a maternal mortality of 7.3 per cent., while this is considered a high figure for the classical section.

It is generally considered that nephritics and hepatitics are poor subjects for laparotomy, and the danger comes mainly from the anesthetic. By means of nitrous oxid and oxygen anesthesia, this element may be reduced to an almost negligible minimum. Given a primipara, at or near term, with a long closed cervix and living child, the patient being in a good maternity hospital, I would strongly incline to abdominal Cesarean section.

RIGIDITY OF VAGINA AND PELVIC FLOOR

In the discussion of operative delivery, the resistance opposed by the cervix only has been mentioned, but the vagina and pelvic floor must by all means be considered. Rigidity of these structures is one of the strongest arguments against vaginal Cesarean section, because even if we do the deep perineotomy advised by Dührssen, it is not always possible to avoid extensive lacerations of the vagina, the pelvic floor, the perineum, the anus and the bases of the broad ligaments.

In performing episiotomy, one should not be afraid of cutting deeply into the levator ani muscle, because this can be accurately sutured, whereas, if brute force in delivery is used, the muscle may be torn from the bony attachments—an irremediable injury. Where only slightly more room is needed, this may be obtained by stretching the muscle with the fingers or fist, but I have seen deep lacerations of the parts produced thus as well

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as by the head. I recommend the medio-lateral episiotomy and am not sparing with the incision.

A strong distinction must be made between hospital cases with an obstetric surgeon in charge and private practice by a general practitioner. For the latter, slower methods of treatment are to be recommended, first rupture of the membranes, then hastening the delivery as much as is safe, by metreurysis, manual dilatation, and, when the cervix is thoroughly effaced, incisions if necessary.

SURGICAL MEASURES

Venesection is a surgical procedure, but will probably be spoken of under the heading "medical measures," as also will saline solution administered hypodermically. Care should be taken with the dosage of saline solution, as edema of the lungs may be superinduced. Newell in one case transfused human blood.

Of the surgical measures special mention is to be made of decapsulation of the kidneys, first proposed by Edebohls. Chirié, in June, 1909, collected thirty-three cases of renal decapsulation, and finds that in only one-half of the patients do the convulsions cease after the operation, but many authors note that they are less severe. Unanimous accord exists regarding the postoperative diuresis—the amount of urine almost always increases, and there is decrease of the albumin casts, etc., and augmentation of the urea and solids. The edema subsides rapidly and consciousness returns quicker. The wounds heal well if due attention is paid to asepsis, but several instances are noted of suppuration due to dislocation of the dressings during convulsions and restlessness—one fatal case of infection and one fatal case of iodoform poisoning from gauze used in packing. In the one case in which I was consulted, the convulsions ceased, diuresis improved, but the woman died in coma three days after operation. It is impossible at the present time to pass judgment on this procedure, and also on the advisability of nephrotomy in addition to decapsulation. Sippel and

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a few German authors perform and recommend it. It is occasionally done in England and America. It has not had a fair trial since only cases that prove refractory to all other methods are submitted. Considering what we know of the causation of eclampsia, the operation is not rational, but it is perhaps as reasonable as any one of our other "specific" remedies. Chirié, in his thirty-three cases, found sixteen deaths, which is not encouraging. The literature will be found in Chirié's article, *Obstétrique,* June, 1909, and in the *Edinburgh Medical Journal,* May, 1909. Johnsen, in the *Deutsche medizinische Wochenschrift,* January, 1910, says that forty-two cases are on record with eighteen deaths. The general mortality of eclampsia is not as high as this.

ANESTHETICS

Early in my practice I learned two facts: one, that morphin given to eclamptics killed many of the babies and prolonged the postpartum coma, and the other, that chloroform is a very dangerous drug in eclampsia. It causes acute yellow atrophy of the liver and cardiac paralysis, acute and chronic. Whereas, I formerly advised anesthesia for every vaginal examination or manipulation to prevent a convulsion from resulting from the local irritation, I now restrict anesthetics and narcotics to an irreducible minimum. For the operative delivery, I have used ether, but for Cesarean section I employ nitrous oxid and oxygen, because the child is delivered so rapidly that the preliminary asphyxia is of no moment. Cragin and Ewing also have emphasized the dangers of chloroform.

34 Washington Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. DAVIS AND FOULKROD, CRAGIN AND HULL, FRY, PETERSON AND DE LEE, CONSTITUTING A SYMPOSIUM ON ECLAMPSIA

DR. HENRY SCHWARZ, St. Louis: The report on the changes caused in the liver of dogs by chloroform narcosis is of great interest and will make us hesitate to use chloroform in cases of eclampsia, for fear of lowering the resisting power of our

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patient. We all agree that we should try to prevent eclampsia rather than to cure it. I am sure that in the case of women who place themselves under medical supervision early in pregnancy, the frequency of eclampsia has been much reduced. A great many women in city and country are delivered by midwives; much would be gained if the medical profession could educate the public so that these women would learn the necessity of placing themselves under medical supervision during pregnancy, even if they continue to be delivered by midwives. Great good would be accomplished if the urine were examined once a month during the first half, and twice a month during the second half of pregnancy. All organs of elimination, the skin, the kidneys and the bowels, should be kept in perfect working order; pregnant women should learn to live on mixed diet. Plenty of vegetables, plenty of fruit, plenty of cereals, little meat and plenty of pure water will do a great deal to prevent eclampsia.

DR. ERNST G. ZINKE, Cincinnati: The pathology of eclampsia has been well presented; but the problem still remains unsolved. It is also a serious question which mode of treatment has contributed most to the reduction of the maternal—and fetal—mortality of this frightful obstetric complication. In my own opinion prophylaxis is of the greatest importance; and intelligent medical treatment, when convulsions supervene, has contributed more to the reduction of the maternal—and fetal—mortality than all the surgical interventions designed for emptying the uterus. In this view I am well supported by authors and practitioners at home and abroad. He who has had years of experience in the practice of obstetrics, will readily admit that many patients with puerperal convulsions have recovered when left alone. In some instances spontaneous delivery has occurred, even with the child living. These cases are not at all isolated. I can portray to you a picture which I observed in one of the European hospitals nineteen years ago. The impression it made on me has never been obliterated from my mind. This particular patient was left to herself in bed, with only a nurse at her side who saw to it that the patient did not hurt herself as she went from one convulsion into another. The attacks exceeded 100 within three days; and yet, she delivered herself spontaneously and recovered. When I witnessed this performance I thought to myself, that the man who would pursue this mode of treatment of puerperal eclampsia in this country would run the risk of being tarred and feathered. And still it teaches a lesson not to be regarded lightly. Some of you, no doubt, have seen cases of puerperal eclampsia, occurring in the seventh or eighth month, from which the patient recovered, after several seizures, under medical treatment, the pregnancy remaining undisturbed until term, and terminating spontaneously and favorably for both mother and child. This

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is the other side of the picture, and I merely present it to call attention to the fact, that surgical intervention, though necessary at times, is not the prime factor in the treatment of puerperal eclampsia, and that, if there is a reduction in the mortality of this disease between the present and the past, surgery has contributed little or nothing to it.

DR. J. H. CARSTENS, Detroit: We all admit that we know nothing about convulsions either in children or in adults; that one patient will have one convulsion and die, another will have a hundred and recover, and that another will die after ten or fifteen. We know that with one convulsion the patient may become paralyzed, or may lose one of her senses. We must know that the sooner we stop the convulsion the less liable is the patient to be injured. Now, the fact that my friend from Cincinnati has seen an isolated case in which they left the poor woman for three days and she recovered does not relieve us from the guilt of bad practice when we fold our hands and roll our eyes to heaven and say, "The Lord's will be done." What in the name of heaven are we here for? What is to cure the toxemia? The quickest way is to deliver the woman. Ninety-five per cent. will not have any convulsions after delivery, and those few cases that do occur after delivery simply point to the rule that the convulsion is stopped when the woman is delivered. The quickest method of delivery is the best. If we decide that the method which Dr. Peterson has so beautifully described is the proper one, it is up to everybody to learn that. Every one of us who has had much experience will only be too delighted to show the general practitioner the technic of the operation. We all cut into the bladder once in a while even now with all our experience, and if the poor general practitioner will save that woman's life I will forgive him, if he does the same, for a live woman is better than one that is buried six feet under the ground.

DR. F. J. PLONDKE, St. Paul: It is true that after delivery in the majority of cases the convulsions cease. There are, however, a certain number of cases in which they continue, and in still others they do not develop until after delivery has taken place. We have heard today, that while we do not know the exact nature of the toxins causing puerperal eclampsia, we do know that they are found in, and are distributed by, the blood-current, and that sooner or later they cause irritation of the liver and kidney cells. Taking this for granted the indication for treatment, whether the convulsions develop before or after delivery, are the same; viz., to eliminate as much of the poison as possible, and neutralize by dilution or otherwise, what remains. I have met these indications in a number of cases during the past two years by opening a vein and inserting a glass cannula in the distal end, through which

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blood is allowed to flow away; through the same opening, but into the proximal end another cannula is inserted through which physiologic salt solution is carried into the vein. The amount of blood withdrawn, ranging from 15 to 30 ounces, depending on indications (usually about 10 ounces), was allowed to flow away before the introduction of salt solution was begun; from 1 to 2 quarts of salt solution was used in each case.

I have used this treatment in ten cases; seven puerperal and three of convulsions in chronic nephritis, with the result that in each case the convulsions ceased at once and in no case did they reappear.

I realize that these are only a few cases from which to draw a conclusion, but the results have convinced me that the treatment merits further trial.

DR. T. M. BURNS, Denver: I wish to make a few remarks on the lack of danger in the use of Cesarean section for eclampsia. During the last five months I assisted at one operation and performed the operation nine times. Only two of the operations were for eclampsia, but in both of these we had excellent results. The operation of Cesarean section *per se* is without any shock whatever. The immediate results are perfect. We get a living child and the mother is just as good after the operation as before. The patient gets up in better condition than from any other abdominal operation. Even in the infected cases hysterectomy is unnecessary. Skilled assistants are essential, especially in giving the anesthetic and taking care of the baby.

DR. M. I. ROSENTHAL, Fort Wayne: From the standpoint of the gynecologist this operation presents another advantage which I believe will bear emphasis. Lacerations of the cervix frequently do not amount to anything, are easily repaired and are not of serious significance. A deep laceration laterally in the cervix extending up into the vault of the vagina, making a tear into the broad ligament is a very serious thing, however. You have formed a fibrous tissue in the broad ligament, and chronic invalidism is produced which you are not able to reach by plastic operation. Such a tear in the broad ligament produces a very serious condition. This operation fixes the trauma in the cervix at a point where it is rather an immaterial affair, so that if it does not heal it can be repaired or left as it is.

DR. C. A. RITTER, Kansas City, Mo.: Among the most important questions requiring attention and demanding a rational answer is, Where, when, and how are we first to detect the danger-signals of eclampsia, and what are the prophylactic measures best calculated to furnish protection to the pregnant woman? In order that the greatest safety may be given her, she should be placed under the care of a physi-

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cian from the earliest weeks of gestation to the close of the puerperium. It is our duty as physicians to educate the public, showing the necessity of more extended time and attention being given the prospective patient as she travels along the border line between health and disease. By early placing her under the care of an attendant, many of the worst complications of eclampsia may be prevented. We assert that the symptomatology of eclampsia is shot through and through with danger signals of sufficient importance to enable the close observer and intelligent physician to institute prophylactic treatment, and thereby modify or cut short the severity and dangers of the eclamptic storm. As to preventive treatment, diet and elimination, the latter by the way of skin, kidneys and bowels, is of greatest importance. I have received benefits from doses of veratrum, using six to ten drops hypodermatically. In the above dosage, we reduce arterial tension, securing the full physiologic benefits in the way of diuretic, diaphoretic, and antipyretic action. I have had good results in withdrawing from 10 to 20 ounces of blood, replacing the same with similar amount of physiologic saline solution. The choice of operation depends on the character of the individual case. It is impossible to lay down any hard or fast rules. Manual dilatation, with delivery of child by version or forceps extraction, great care being exercised to reduce shock and traumatism to the minimum, is the operation largely employed in the private practice, while vaginal or abdominal Cesarean section is more frequently adopted in hospital work.

DR. C. FOULKROD, Philadelphia: Dr. Carstens spoke of the expectant treatment. We have the records of the Stroganoff method in which the patients are put in a quiet room, the bowels kept open and good results are obtained. Then there is the argument advanced that if a toxemic patient is taken early enough, put to bed, given a milk or peptonized milk diet, she will not have convulsions. I have seen patients treated in this way come back almost from the grave. Stroganoff says that if we let the patient alone Nature will take care of the separation and the delivery of the baby by the cutting off of the placental circulation. I am inclined to deliver because I think my results have been better. If bleeding is needed I find the results are better if this is done after delivery.

DR. E. T. HULL, New York: Bleeding used to be done at the Sloane as a routine. Since then better results have been obtained by the use of veratrum viride and nitroglycerin as outlined, repeating the dosage if necessary to get the desired result. It is well recognized that once the blood-pressure is down and once the pulse is slow, convulsions will no longer occur. If we were not able to bring about this condition by medication, then bleeding might be done, but that is very

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rarely necessary. In the third stage, bleeding may be allowed from the uterus with the idea of getting rid of toxins. As far as introducing salt solution is concerned I think that has to be done cautiously. With an overwatery condition of the blood one of the dangers is increased, that of edema of the lungs.

DR. H. D. FRY, Washington, D. C.: When these cases have reached the point of eclampsia they have gone too far to talk about preventive treatment. In regard to the let-alone plan of treatment the statistics have shown that surgery does a great deal of good in these desperate cases; that the mortality has been reduced by immediately emptying the uterus by surgical means and not using the expectant treatment. The mortality under the expectant treatment is between 30 and 40 per cent., and by immediate delivery, between 3 and 7 per cent. I was much surprised last month to hear Dr. Hirst read a paper advocating medical means in preference to emptying the uterus. He is the only obstetrician whom I have known to recently bring out such a view.

This sleight-of-hand technic described by Dr. Peterson, in which now you see the bladder and now you don't, is very alluring. It is easy with a piece of gauze to push the bladder out of the way, but you cannot ignore the uterovesical ligament. Dr. Bandler in his paper this morning brought out an important point in this connection showing how to avoid injury to the bladder. An important step when taking off the forceps is to pass a heavy ligature to hold the bladder back, and to act as a guide in bringing the cervix down.

I always drain, putting in gauze. In regard to chloroform, I saw a case some time ago which emphasized the dangers of using this anesthetic. The woman was delivered with forceps in the right occipitoposterior position, chloroform being the anesthetic. The lacerations were afterward repaired and the patient got along beautifully until the third day. She had had no symptoms of toxemia and the urine was perfectly clear. In thirty-six hours she was dead. The urine had been examined repeatedly without finding albumin or casts or the slightest trace of trouble with the kidneys. It was a plain case of liver poisoning from the use of chloroform and that case taught me a valuable lesson.

In a case of eclampsia with the woman undelivered the best way to bring down the blood-pressure is to empty the uterus. The blood-pressure may be brought down by bleeding, by giving veratrum viride or by rupturing the membranes; but the quickest way is to empty the uterus.

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THE PARTICIPATION OF THE TISSUES ADJACENT TO THE UTERUS AND OF THE PELVIC LYMPHATICS IN UTERINE CANCER

JOHN A. SAMPSON, M.D.
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Cancer may arise either in the body or in the cervix of the uterus. The former variety is infrequent, occurs as often in nulliparous as in parous women, and the average age of those afflicted is greater than in cancer of the cervix. Its growth is usually slow and it remains restricted to the uterus for a relatively long period of time (Fig. 1). For the latter reasons the diagnosis is usually made while it is limited to the uterus and hysterectomy for this condition is attended with a low primary mortality and a high percentage of cures.

Cancer of the cervix, on the other hand, is one of the most frequent varieties of primary carcinoma; it usually occurs in parous women; and it is more often a disease of midlife than of old age. (A large percentage of its victims are under 45 and its occurrence in those under 35 is not infrequent.) Its growth is often rapid and it soon extends beyond the cervix by the direct invasion of the adjacent tissues (Fig. 2) and by metastases to the lymph structures of the pelvis. Its frequency, virulence, the youthful age of many of its victims and the fact that they usually have children make it one of the most dreaded diseases and one of the most important problems confronting the gynecologist at the present time. Its rapid growth and early extension beyond the uterus have in a large measure been respon-

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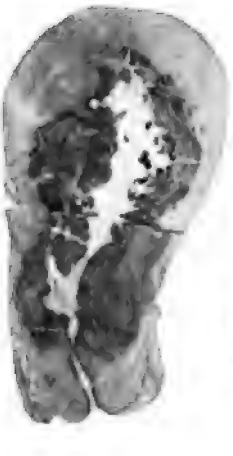

Figure 1

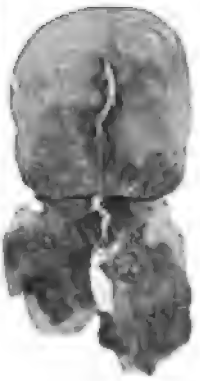

Figure 2

Fig. 1.—Advanced cancer of the body. From photograph of stained median sagittal section of the uterus (× ½), operative specimen. The growth usually does not extend beyond the uterus until late in the course of the disease, and in the majority of cases the diagnosis is made before this has taken place. Hysterectomy is attended with a low primary mortality and a high percentage of cures.

Fig. 2.—Advanced cancer of the cervix. From photograph of stained median sagittal section of the uterus (× ½), operative specimen. The growth usually extends beyond the cervix early in the course of the disease and the diagnosis is rarely made while it is restricted to the uterus. Hysterectomy is attended with a high primary mortality and a very low percentage of cures.

Figure 3

Figure 4

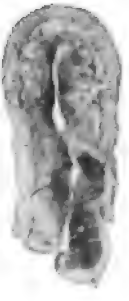

Figure 5

Fig. 3.—Everting cancer of the portio vaginalis (× ½). Less frequent and malignant than the following; bleeding usually occurs early, the growth is readily detected on inspection and palpation.

Fig. 4.—Inverting cancer of the portio vaginalis (× ½). One of the most frequent and malignant types; bleeding may not occur until late in the course of the disease and the diagnosis is not as easily made as in the preceding.

Fig. 5.—Inverting cancer of the cervical canal (× ½). This type is apparently less frequent and less malignant than the same type arising in the portio vaginalis; bleeding may not occur until late in the course of the disease. In its early stages a diagnosis can be made only through curettage of the cervical canal.

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sible for the failure of its recognition while it is still confined to that organ. In a large percentage of the cases the condition is detected too late for anything but palliative treatment, and hysterectomy is attended with a high primary mortality and a very small percentage of cures.

On account of its greater frequency, malignancy and importance, cancer of the cervix alone will be considered in this communication.

Clinical experience has taught that only a small percentage of patients have been cured by operation; thus suggesting that either the entire growth had not been removed or, through faulty technic, the pelvic tissues had been infected with cancer at the time of the operation, or that there has been a true recurrence of the disease.

It is evident that a knowledge of the exact extent of the disease, especially in the "operable" cases, is of the greatest importance in the intelligent treatment of this condition.

The study of the specimens removed by the more radical operations has shown that the disease had extended beyond the uterus in a large percentage of them. The careful studies of Kundrat[1] in Wertheim's clinic have been of great value. He found in eighty cases that the growth had extended beyond the uterus in forty-eight and that in all but four of these the parametrium of one or both sides was involved. In twenty-two cases the parametrium was involved but not the pelvic lymph-nodes which had been removed. Cancer was found in the lymph-nodes in twenty-six cases. Similar studies have been made in other clinics and they all, in the main, confirm the findings of Kundrat.

In 1906 I reported[2] the results of a careful study of twenty-seven specimens removed in Dr. Kelly's clinic at the Johns Hopkins Hospital. Cancer was found in

1. Kundrat: Arch. f. Gynäk., 1903, lxix, 355.
2. Sampson, J. A.: Am. Jour. Obst., 1906, liv, 433.

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the parametrium in seventeen instances, eight times as direct extension alone, either in the form of thread-like processes or *en masse:* three times as metastases in the lymph structures of the parametrium without any evidence of a direct extension of the disease from the cervix; and in six cases both forms of invasion were present. In nineteen cases some of the pelvic lymph-nodes had been removed, and cancer was found in nine of these. In three of the latter there was no evidence of cancer in the parametrium. I am at present studying the material from eighteen additional cases; fourteen of the specimens were obtained by me at operation, and four at autopsy from patients dying during the advanced stages of the disease. These latter studies are being conducted in the Bender Hygienic Laboratory of this city where I have been granted every facility for this work. While it is not yet completed it confirms the findings in the previous report.

We may classify cervical cancer according to its origin, whether from the portio vaginalis or from the mucosa of the cervical canal. Irrespective of their situation or histologic structure the growths may usually be grouped as either everting (vegetative) or inverting (infiltrating). Intermediate types are seen, and possibly in the progress of the disease a growth may sometimes pass from one morphologic type into the other.

The everting type, arising from the portio vaginalis, forms a sessile or pedunculated tumor projecting into the vaginal canal; it tends to spread over the mucosa and gradually invades the underlying tissues (Fig. 3). It is apparently less malignant and less frequent than the inverting form.

In the latter variety the process seems to be reversed. The growth soon extends into the deeper tissues and sometimes with very little evidence on the surface (Fig. 4). Necrosis often occurs early with a resulting loss of tissue and the formation of the so-called ulcers. This

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variety is apparently the more frequent one and also the more malignant. It soon extends beyond the uterus by the direct invasion of the adjacent tissues and by metastases to the lymphatic structures of the pelvis.

The two varieties may also arise from the mucosa of the cervical canal; here the inverting form is the more frequent and malignant, but apparently less malignant than that arising from the portio vaginalis possibly because the growth does not begin as near the periphery of the cervix (Fig. 5). In the cases which I have studied it has occurred in older women than cancer of the portio vaginalis.

THE DIRECT EXTENSION OF CANCER INTO THE TISSUES ADJACENT TO THE UTERUS

If one will make a drawing, to measure, of the specimen removed and, from the careful study of sagittal and cross-sections, reconstruct the extent of the growth in this drawing a very clear conception of the exact relation between the two may be obtained. By means of these studies we learn that cancer may invade the tissues adjacent to the uterus as delicate thread-like processes or *en masse*. These processes are sometimes found in the nerve sheaths, other times in definite lymph-vessels but more often in whatever tissues are nearest the growth, in what are known as lymph-spaces. The parametrium is the tissue most frequently involved and often near the junction of the cervix and the vagina (Fig. 6). This is a very unfortunate situation because here the cervix is in its closest proximity to two very important structures, namely, the bladder and the ureters (Fig. 7). Furthermore, it is very difficult to obtain a wide excision of the parametrium at this level, whereas higher up, where the direct extension is less frequent, a wide excision is much easier. The growth may extend anteriorly, laterally or posteriorly. In its anterior extension it soon reaches the bladder, in its lateral, the tissues about the ureters, while posteriorly it is separated from

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the rectum by the cul-de-sac. The place at which the cancer extends beyond the cervix is determined by many factors, such as its origin, *i. e.*, whether in the portio vaginalis or the mucosa of the cervical canal, whether in the anterior or posterior lip and whether near the right or left side. There are other factors determining the direction of its growth which we are unable to ascertain. The structures involved by this extension are determined by the above factors and in addition the situation of the cervix in the pelvis whether right or left lateral, whether in descensus or high in the pelvis and also whether the uterus is anteflexed or retroflexed.

The reaction on the part of the tissues involved varies greatly in different specimens. Often there is an increase in connective tissue; at other times an inflammatory exudate in the form of round cells or eosinophils is present; and again there may not be any apparent reaction on the part of the tissue surrounding the growth. The reaction may sometimes be due to the presence of bacteria in the necrotic portion of the growth, but I think that it is often due to the cancer itself, because the tissues involved by the metastases may show the same reaction as those involved by the primary growth.

The Bladder.—In the study of the specimens obtained in the forty-one operative cases the musculature of the bladder wall was found to be invaded by cancer in eight (Fig. 8). In seven of these it occurred at the level previously mentioned, and in one (cancer arising in the cervical canal) the involvement was so great that the part first invaded could not be determined, but it was apparently at a little higher level than the others. In a few of the other cases the bladder was found adherent at the time of the operation and a portion of its outer wall was removed but cancer was not found in this tissue. If the growth causes a marked reaction in the surrounding tissues, the bladder may become adherent to the cervix before the growth has extended through the

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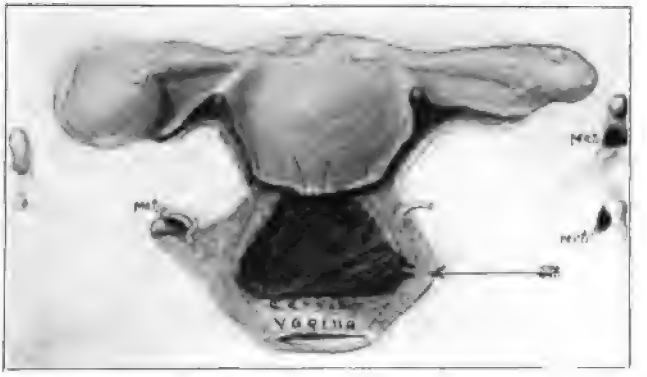

Fig. 6.—The most frequent situation of the direct invasion of cancer into the parametrium. From drawing showing the extent of the cancer in an illustrative case (× ½). In over half of the operative cases the parametrium is already invaded by cancer. This occurs most frequently at the junction of the cervix and vagina (see arrow), where the cervix is in its closest proximity to the bladder and the ureters.

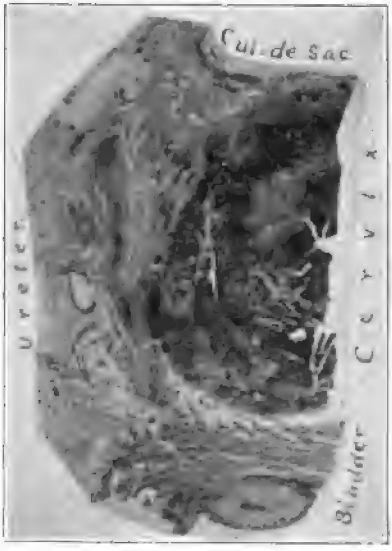

Fig. 7.—Relation between a cancerous cervix, the ureter and bladder. From photograph of stained cross-section of right half of the cervix and adjacent tissues (× 2), operative specimen. The direct extension of the growth from the cervix soon reaches the bladder and the tissues about the ureter. Note that the tissues surrounding the ureter form an imperfect sheath.

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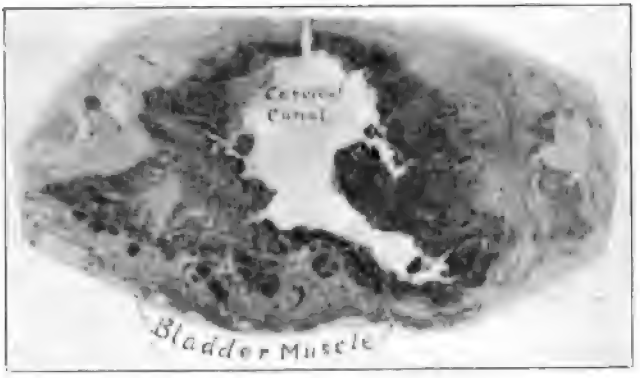

Fig. 8.—The direct extension of cancer into the bladder wall. From photograph of stained cross-section of entire cervix (× 1), operative specimen. The growth has invaded the parametrium laterally and the bladder wall anteriorly. The bladder is often invaded early in the direct extension of cancer from the cervix.

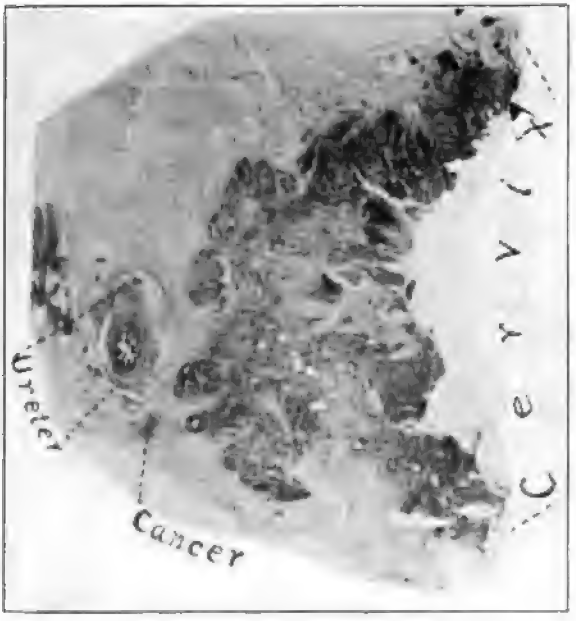

Fig. 9.—The direct extension of cancer into the tissues about the ureter. From photograph of stained cross-section of right half of the cervix and adjacent tissues (× 2), operative specimen. The growth has invaded the tissues (sheath) about the ureter, causing a hypertrophy of the latter, which may temporarily protect the ureter. The tissues about the ureter are often involved early in the direct extension of cancer from the cervix.

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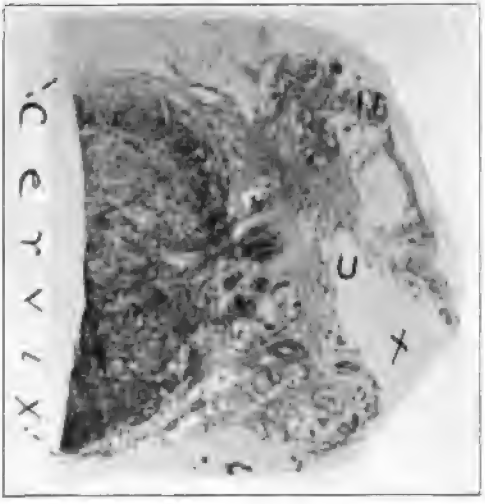

Fig. 10.--Marked hypertrophy of the tissues of the parametrium invaded by cancer. From photograph of stained cross-section of left half of the cervix and adjacent tissues (× 2), operative specimen. This is often present and may temporarily check the extension of the growth. It causes the parametrium to feel indurated, restricts the mobility of the cervix and deceives one as to the exact extent of the disease. U represents the space occupied by the ureter; the tissues about it (sheath) were greatly hypertrophied and these were incised at *x* and the ureter shelled out.

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Fig. 11.—The direct invasion of the bladder wall and the ureter by cancer. From photograph of stained cross-section of right half of the cervix and adjacent tissues (× 2), operative specimen. The bladder wall and ureter are both invaded by cancer. The ureter, while often invaded in the advanced stages of the disease, is apparently rarely invaded in the operative cases even when the surrounding tissues contain cancer. It seems to be more resistant than the surrounding tissues.

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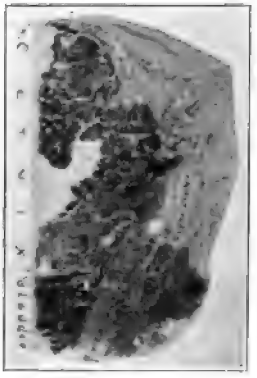

Fig. 12.—The direct invasion of the bladder wall and the intramural portion of the ureter by cancer. From photograph of stained cross-section of left half of the cervix and adjacent tissues, autopsy specimen. The intramural portion of the ureter has been occluded by cancer causing hydro-ureter above.

Fig. 13.—Direct extension of cancer into the parametrium invading and occluding the ureter. From photograph of stained cross-section of left half of the cervix and adjacent tissues (× 1), autopsy specimen. Note the absence of any hypertrophy (reaction) of the tissues about the cancer in the parametrium. Apparently there is very little resistance offered to its extension.

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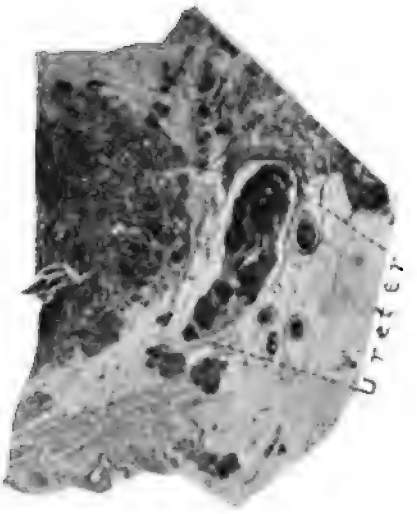

Fig. 14.—Direct extension of cancer in the walls of the ureter. From the same specimen as Figure 13, at a lower level. The growth in the ureter appears as a metastasis, but is not. It is the direct extension downward in the ureteral wall from the cancer shown in Figure 13.

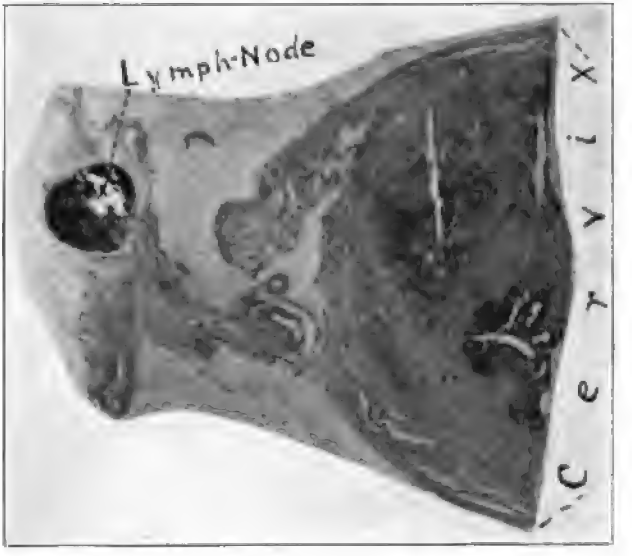

Fig. 15.—Metastasis in lymph-node inconstantly present near the crossing of the ureter by the uterine vessels. From photograph of stained cross-section of right half of the cervix and adjacent tissues (× 2), operative specimen.

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Fig. 16.—Metastasis in a small lymph-node of the parametrium. From photograph of stained cross-section of right half of the cervix and adjacent tissues (× 2), operative specimen. These nodes are normally present in varying numbers and are apparently sometimes increased in size and number in uterine cancer. A metastasis is present in the periphery of the larger node. It is possible that these nodes may sometimes prevent metastases from reaching more distant nodes.

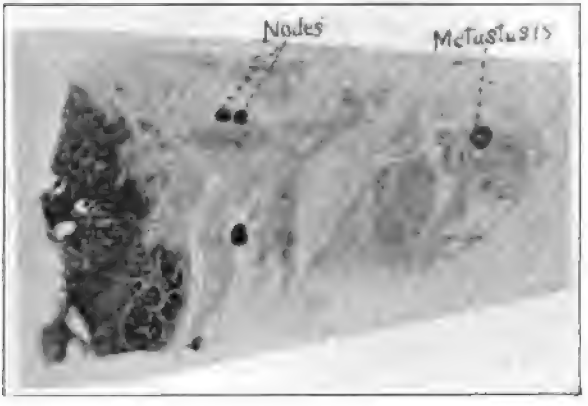

Fig. 17.—Metastasis in an "intravascular" lymph-node of the parametrium. From photograph of stained cross-section of the left half of the parametrium (× 2), operative specimen. These nodes project into the lumen of the lymph-vessels like sponges, are possibly newly formed, and it is possible that they sometimes check cancer as it is carried along the lymph-vessels.

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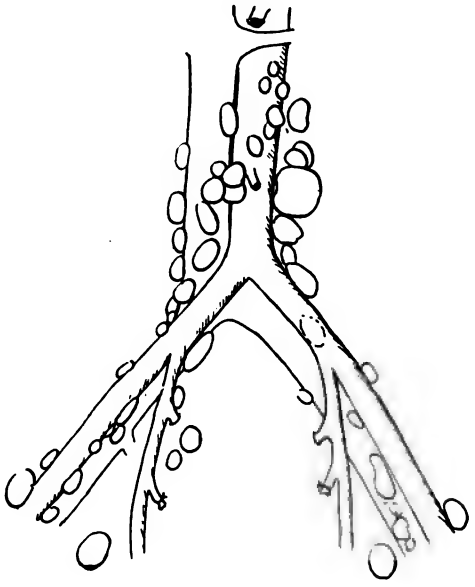

Fig. 18.—The abdominal and pelvic lymph-nodes. The patient died on the seventeenth day after the operation for cervical cancer from bilateral renal infection (note the increase in size and also apparently in numbers of the lumbar nodes). The abdominal and pelvic blood-vessels with their accompanying lymphatics were removed at autopsy. The lymph-nodes represented were found and carefully examined; no metastases were discovered. The drawing shows the number of nodes which may be present and suggests the great difficulty in removing all of them at operation. See the following illustration.

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cervical tissues. This may be detected during the operation in attempting to free the bladder from the cervix.

A cystoscopic examination was made before the operation in the majority of the cases referred to in this paper and I have also examined the bladder in other cases. One is not always able to determine from this examination whether or not the bladder is involved; in some cases I have thought it was, and later it proved not to be, and *vice versa*. If the involvement is slight there may not be any changes which may be detected through the cystoscope. In other cases one may detect a localized thickening of the bladder wall with or without any apparent change in the mucosa. The latter is sometimes injected or edematous. In the later stages of the disease the growth itself may be easily seen. The early involvement of the bladder has not received the attention it deserves. Its most important feature is that the growth may invade the intramural portion of one or both ureters.

The Ureters.—It is well known that hydro-ureter and hydronephrosis, due to compression or actual invasion of the lower end of the ureters, exists in a large percentage of the patients dying in the advanced stages of the disease. The renal insufficiency resulting from stricture of the ureters is a frequent cause of death. The proximity of the ureters to the cervix, the early invasion of the parametrium, especially at the level where the ureters are nearest the cervix, the frequency of accidental injury to these ducts in hysterectomy for uterine cancer, together with the autopsy findings mentioned above, would cause one to infer that the ureters were actually involved by the growth soon after its extension from the cervix. I have studied very carefully the parametrial portion of twelve ureters (twice a double ureter was present, thus making fourteen) which had been resected on account of the apparent invasion of the parametrium about the ureters by cancer. In four cases

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both ureters had been resected and in four only one. In only one instance was I able to find a ureter actually invaded by cancer. In all these cases cancer was present in the parametrium and in some the invasion extended into the tissues about and even beyond the ureter. The single instance of invasion of the ureter occurred in its intramural (vesical) portion from cancer present in the wall of the bladder.

I have-concluded (possibly from insufficient data) that the ureter is rarely invaded in the operative cases and have attributed this to three possible factors, first, its peristalsis, second, the protection afforded by its "sheath," and third, that there may be sufficient difference in the lymphatics of the cervix and ureters to render the early invasion of the latter infrequent. It seems remarkable that in a series of forty-one cases the bladder was involved in eight instances and a ureter only once and yet we realize that the main lymph-channels from the cervix cross the parametrial portion of the ureter. In previous papers I have called attention to the "ureteral sheath" and have stated that I believed that the peristalsis of the ureter converted the tissues about it into a form of sheath which is not a distinct anatomic structure but simply the tissues along the course of the ureter which had been molded into this shape (Fig. 7). In those cases in which the parametrium is invaded and there is a reaction on the part of the tissues involved with the formation of connective tissue, this "sheath" may become markedly hypertrophied (Figs. 9 and 10). In this hypertrophied condition it may afford temporary protection to the ureters. As this hypertrophy increases the ureter becomes compressed and later may become invaded by cancer. This marked thickening of the "sheath" may possibly arise from two sources, first, the reaction arising from its invasion by cancer and second, the local irritation caused by the ureter rubbing against it during its peristalsis.

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From the study of material obtained at autopsy of those dying in the advanced stages of the disease I have found that the ureter may become involved from three sources; first, its intramural (vesical) portion from cancer in the bladder wall (Fig. 12), second, its parametrial portion from the direct extension from the primary growth (Fig. 13) or from metastases to lymph-nodes of the parametrium, and third, the pelvic portion above the parametrium from the direct extension from metastases in the pelvic lymph-nodes. Once gaining access to the ureter, the growth may extend in its walls and sections taken at other levels may show what appear like metastases in the ureter (Fig. 14).

The Vagina.—The involvement of the vagina presents three pictures: the direct extension over the surface, the direct invasion of the deeper structures from above which may appear without any evidence of the disease on the surface other than a slight elevation caused by the growth in the underlying tissues, and finally the so-called implantations. Aside from an occasional slight involvement of the vagina at its junction with the cervix, in only four of the forty-one operative cases was there any marked invasion of its tissues.

I have had the opportunity to study only one "vaginal implantation" where the tissue between it and the primary tumor was intact. In this instance I found that the implantation was apparently connected with the primary tumor by a thread-like process of cancer, *i. e.*, it was a direct extension of the growth and did not result from a "retrograde metastasis" or implantation of cancer cells in an abrasion of the vaginal mucosa. I used the word "apparently" because complete serial sections were not made and thus I cannot state that the thread of cancer was intact for its entire course from the primary growth to the nodule in the vaginal mucosa.

Rectum.—In only one of the operative cases was the rectum invaded, and this resulted from the direct exten-

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sion posteriorly with obliteration of the cul-de-sac and invasion of the anterior wall of the rectum. The rectum may also be invaded by the extension of cancer in the posterior vaginal wall.

Body of the Uterus, Tubes, and Ovaries.—The body of the uterus was involved in only seven of the forty-one cases, and in all of these the disease was advanced. This is more apt to occur in cancer arising in the cervical canal, especially if it is of the adenomatous variety. The tubes and ovaries were not examined microscopically in this series, but there was no evidence of cancer in them which could be detected in the gross specimens.

METASTASES

Apparently if cancer once gains access to a lymph-vessel it either grows in the vessel in continuity with the primary growth or, if set free, it is carried by the lymph-stream and usually does not stop until it reaches a lymph-node whether it be situated in the parametrium or further on. Metastases to structures other than lymph-nodes are very unusual.

Metastases may be divided into four regional groups occurring in the following regions: The parametrium, pelvic lymph-nodes, abdominal lymph-nodes, and lastly, other parts of the body.

Parametrium.—Metastases to the lymphatic structures in this situation are of frequent occurrence. A careful study of the parametrium has been completed in thirty-two of the forty-one operative cases and parametrial metastases were found in ten of these. In this situation we may recognize four varieties of lymph-nodes:

1. The relatively large lymph-node which is inconstantly found near the crossing of the ureter by the uterine vessels.

2. Small lymph-nodes scattered throughout the parametrium.

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3. Small lymph-nodes projecting into the lymph-vessels, *i. e.*, intravascular lymph-nodes.

4. Newly formed lymph-nodes which apparently do not bear any relation to the lymph-vessels and in which I have never seen any metastases.

The Parametrial Lymph-Node Inconstantly Present at the Crossing of the Ureter by the Uterine Vessels.—It was found and removed eight times in this series of forty-one cases (and only on one side). Cancer was present in three of the nodes removed and in none of these did it apparently alter in any way the surrounding tissue (Fig. 15).

Small Lymph-Nodes Scattered Throughout the Parametrium.—These are apparently typical lymph-nodes and occur normally in varying number. They were present in the parametrium obtained at autopsy from six women dying from other causes than uterine cancer and were found in the parametrium of all specimens of cervical cancer I have studied. They are apparently sometimes increased in numbers in the latter cases and occasionally in size. They are usually found along the course of the main lymph vessels. In one instance a typical node was found in the tissues of the cervix itself (outer portion). Metastases were found in these nodes in four of the thirty-two cases in which a complete study of the parametrium has been made (Fig. 16). In one case there was a thickening of the tissues about the node and in another the retrograde growth of the cancer from the node into the afferent lymph-vessel. The infected nodes were apparently not increased in size and in two there was no change in the surrounding tissues.

Intravascular Lymph-Nodes.—These small nodes project into the lumen of the lymph-vessels like sponges. I do not know if they may occur normally in the parametrium or if they may be associated with diseased uterine conditions other than cancer. They were not present in the six autopsy specimens previously mentioned and

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I have found them in only four specimens of uterine cancer and only in the parametrium. In three of these four cases, cancer was found in one or more of these nodes (Fig. 17). Possibly they are newly formed lymph-nodes and later develop into the small lymph-nodes previously described; or they may be the latter observed under different conditions of activity. In one specimen they were very numerous; in a section taken at one level eight were present.

Small Lymph-Nodes Which Apparently Do Not Bear Any Relation to the Lymph-Vessels.—Collections of lymphoid tissue about blood-vessels may be present in large numbers, appearing in the section as darkly stained areas the size of miliary tubercles. They apparently owe their origin to a stimulus directly or indirectly caused by the cancer, but do not necessarily bear any relation to the lymph-vessels. I have never seen any metastases in these nodes.

Pelvic and Abdominal Lymph-Nodes.—The study of the material obtained from those operations where some of the pelvic lymph-nodes have been removed have shown that metastases occur in from one-third to one-half of these cases. I have studied the material from twenty-three of these cases and found cancer in the pelvic lymph-nodes in twelve. While these metastases occur more frequently in patients with extensive primary tumors they may be present in very early cases. The primary tumor may be very small, the parametrium free and yet metastases may be present. This occurred especially in the inverting type arising in the vaginal portion of the cervix. The glands most frequently found involved were those situated in the triangle between the external and internal iliac vessels and along the external iliacs. I do not think that my observations are of any great value in determining the exact distribution of metastases in the pelvic lymph-nodes because the above mentioned nodes were the ones most frequently

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removed and often others were not removed which might have been infected. Cancerous nodes were found at the promontory and even in the lumbar region in operative cases.

I have studied all the abdominal and pelvic lymph-nodes in three operative cases. The patients died as the result of the operation and the lymphatics were obtained at autopsy. All the glands were cut and an attempt was made either to find or to exclude cancer. This was done by cutting the entire gland in alternately thin and thick sections, staining all the sections and mounting them in water and examining them with the lower power of the microscope. If any doubt arose the doubtful section was mounted in balsam and examined more carefully. Metastases were found in only one of these cases. In this instance three nodes were found to contain cancer (Fig. 19).

The early metastases are usually found in the periphery of the node along its convex border or near its proximal pole. The reaction varies greatly. A node, even when nearly completely destroyed by cancer, may be but very little increased in size and without any change in the surrounding tissues. The node may be greatly enlarged and still the surrounding tissue may be apparently unaltered. In other cases there may be a marked increase in the connective tissue about the infected node even when not actually invaded by cancer (Fig. 20).

Metastases to the lymph-nodes in other parts of the body may occur but they are very infrequent.

CONCLUSION

The term "cancer of the uterine cervix" defines the exact condition present in only a very small percentage of the cases when first seen by the physician. In more than half of them the growth has so extensively invaded the adjacent structures that palliative treatment alone is indicated and in over half of the operative cases the growth has already extended beyond the uterus. As in

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its extension it invades the lymph-spaces of the adjacent tissues and metastases occur in the lymph-nodes of the parametrium, pelvis and even the abdomen, this condition should be studied and treated as carcinoma of the lymphatics of the uterus and adjacent tissues.

In its direct extension the lymph-spaces of the parametrium are usually first invaded, then those of the bladder wall and rarely, in the operative cases, those of the ureters, although the tissues about them may be infected and in this way the ureter may be compressed. Later in the course of the disease one or both ureters are very apt to be invaded.

Metastases to the pelvic lymph-nodes are present in at least one-third and possibly over half of the operative cases. While they are more frequently found in the advanced than in the early ones, they may be present in cases in which the primary growth is very small and the adjacent tissues free from cancer. Metastases to the abdominal nodes are sometimes present in the operative cases. I do not know their frequency and whether or not they may be present in the very early ones.

Should the operative treatment of this condition be based solely on laboratory findings it would consist in first, dissecting the lymphatics from the blood-vessels of the lower abdomen and pelvis, then freeing all the tissue lateral to the cervix from each pelvic wall and removing it, together with the lower portion of both ureters, the uterus and any portion of the bladder wall which may be adherent. We know that the ureters are actually invaded by cancer in only a small percentage of the operative cases but the tissue about them is very likely to be invaded and the main lymph-vessels cross them. In order to remove this tissue undisturbed the lower portion of the ureters would have to be sacrificed. The clean dissection of the lymphatics of the lower abdomen and pelvis is very difficult even in a cadaver and takes a long time—too long with our present technic for any patient to stand on the operating table. The

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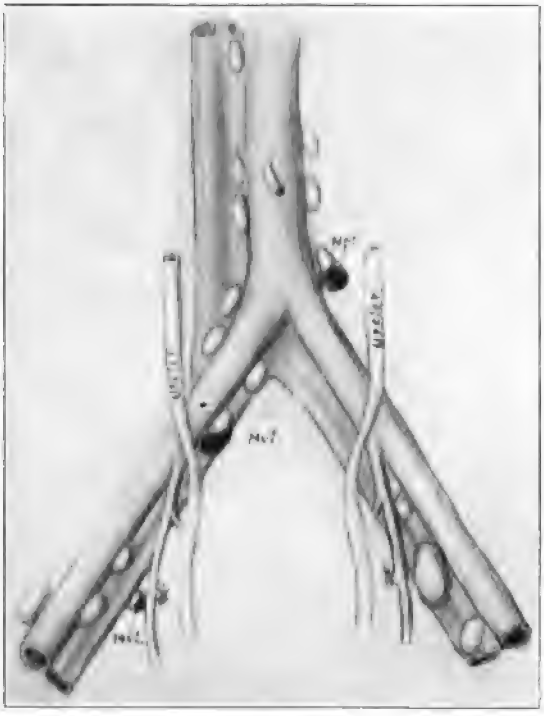

Fig. 19.—Metastases in the pelvic and abdominal lymph-nodes. The patient died on the fifth day after the operation. The abdominal and pelvic blood-vessels with their accompanying lymphatics were removed at autopsy. The lymph-nodes represented were found and carefully studied. Metastases were found in those indicated.

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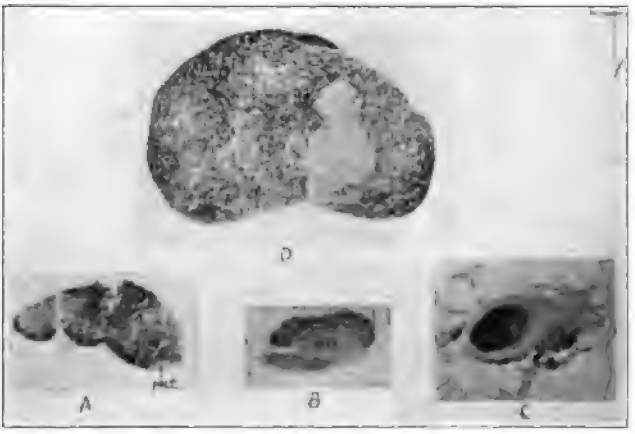

Fig. 20.—Metastases in pelvic and abdominal lymph-nodes showing variations in reaction on part of nodes. From photograph of stained sections of these nodes (× 1), operative specimens. A, early metastasis in the proximal pole of an iliac node. The node is apparently hypertrophied, but there is no reaction in the tissues about it. B, metastasis in a similar node. Over half of the node has been replaced by cancer, yet the node is apparently but very little increased in size and the tissues about it are unaltered. C, another metastasis showing that the cancer has invaded the surrounding tissues and these are markedly thickened. D, lumbar node diffusely invaded by cancer and greatly enlarged. There was no reaction on the part of the surrounding tissues.

Fig. 21.—Advanced cancer of the cervix with extensive involvement of the bladder and resulting vesicovaginal fistula (patient only 25 years of age). From photograph of medium sagittal section of the pelvis. Line A-B indicates the plane at which the section illustrated in the following figure was taken.

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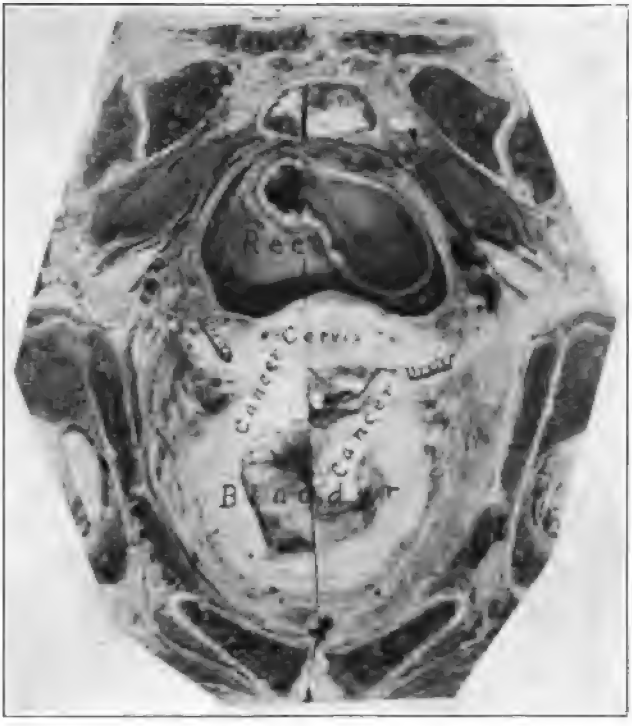

Fig. 22.—Cross-section of the pelvis through the plane A-B in Figure 21. Wires are inserted in the lumina of both ureters. The one in the right ureter can be seen protruding into the bladder at the margin of the vesicovaginal fistula. The ureteral walls are invaded by cancer, causing hydro-ureter, hydronephrosis with resulting renal insufficiency and death.

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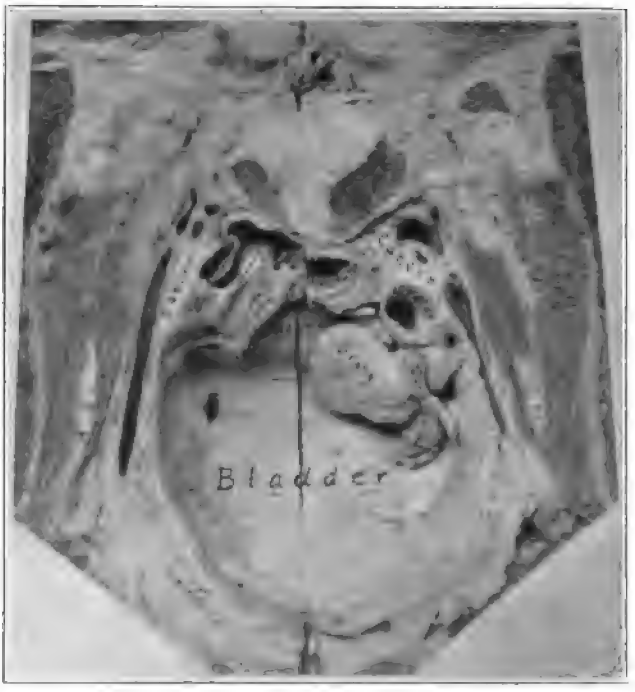

Fig. 23.—Cross-section of the pelvis through the plane C-D in Figure 21. Cancer in the tissues about the iliac vessels can be seen resulting from the extension of the metastases in the iliac lymph-nodes. Marked bilateral hydro-ureter is present, due to the invasion and consequent constriction of these ducts at a lower level; see Figure 22. The diameter of the left ureter is as great as that of the rectum at this level.

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resection of the ureters and their implantation into the bladder is attended with the danger of compressing them, thus causing renal insufficiency and possibly leading to renal infection. Such an operation is attended with a prohibitive primary mortality.

My own experience in the early cases with a wide excision of the parametrium and freeing the ureters with or without the removal of the accessible pelvic nodes has been attended with a very low primary mortality (I have not lost a favorable early case) and I hope for a high percentage of cures. This group of cases is small and sufficient time has not elapsed to render my statistics of any definite value. On the other hand, the operative treatment of the advanced cases, in which I have sacrificed a portion of one or both ureters or resected portions of the bladder wall (and in one case a portion of the rectal wall) has been attended with a high primary mortality (50 per cent.) and the growth has recurred in all patients who have survived the operation. The treatment of the so-called border-line cases, in which there has been a wide excision of the parametrium with freeing the ureters, has also been attended with a high primary mortality and the growth has recurred early in the majority of them. On the other hand two patients who were operated on in July, 1905, and which were unfavorable cases are at present apparently free from cancer. In one of these, metastases were found in the pelvic lymph-nodes. Such instances as these encourage one to operate in unfavorable cases.

As a result of a combined laboratory and clinical study I wish to emphasize the following points:

1. In over one-half of the operative cases the growth has extended beyond the uterus at the time of the operation and the recurrence after operation is usually (possibly always) but a continuation of a growth not entirely removed.

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2. Certain types are more malignant than others. In my experience the inverting type arising in the portio vaginalis is the most frequent and most malignant variety, the same type arising from the mucosa of the cervical canal is less frequent and less malignant, while the everting type is still less frequent and malignant. As was stated in the beginning of the paper, carcinoma of the body is so much less frequent and less malignant than cervical cancer that it was not further considered in this paper.

3. The reaction on the part of the tissues invaded by cancer varies greatly.

A. Sometimes there is very little, thus suggesting that it is unable to resist its invasion.

B. At other times there is a marked increase in connective tissue about the cancer which may retard its growth.

C. The lymph-nodes of the parametrium are sometimes increased in size and new ones are apparently formed. These may check metastases.

4. We are unable to judge definitely of the extent of the disease before the operation.

A. The growth may appear to be very early and yet metastases may be present (especially true of the inverting type.

B. The primary growth may seem very extensive and yet be entirely local.

C. A normal-feeling parametrium does not exclude the possibility of cancer in its tissues.

D. The induration felt in the parametrium is not always due to carcinoma.

E. For the above reasons an apparently favorable case may prove unfavorable and *vice versa*. Exploratory operations are sometimes justifiable.

5. The most radical operation consistent with a "permissible primary mortality" is indicated, especially in the early cases. The first requisite of this operation is a wide excision of the parametrium. The routine

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removal of the pelvic lymph-nodes is still, in my mind, a debatable procedure with our present technic. If the nodes have not been removed, cancer has been left behind in at least one-third and possibly in over half of our operative cases. Against their removal it may be said that it increases the primary mortality and that patients in whom metastases have not yet occurred will die from the operation who would have survived had this not been done. It is also impossible to remove at operation all the lymph-nodes which may be infected, and at best we must be satisfied with their incomplete removal. The more thorough and complete the operation the greater the chance for curing the patient and for these reasons we should do the most thorough operation which we believe that each individual patient will stand.

6. Extensive operations in advanced cases are usually unjustifiable and great care should be exercised in the choice of the border-line cases in which operation should be done.

7. *The most important aid to the treatment of this condition is an earlier diagnosis.*

8. An earlier diagnosis could have been made in the majority of our cases. Sometimes symptoms referable to the growth do not arise until late in the course of the disease, but in *over half* of the *forty-one operative cases* referred to in this communication there was a history of *neglected uterine bleeding* of *over six months' duration.*

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THE RESULTS OBTAINED BY THE RADICAL ABDOMINAL OPERATION FOR CARCINOMA OF THE UTERUS

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The evolution of the modern radical operation for the cure of cancer of the uterus has kept pace not only with the general evolution and progress in surgery but with the modern conceptions of the pathology of cancer as well.

Attempts at the cure of cancer of the uterus by vaginal hysterectomy are recorded early in the nineteenth century; thus we find that in 1813 Langenbeck made a vaginal hysterectomy for uterine cancer. Sauter, in 1821, was the first to remove deliberately a cancerous uterus by the vaginal route. After these first attempts at cures by hysterectomy, isolated instances of operations for this terrible disease are on record, but none were followed by any great success. The real beginning of the modern operation was in 1878, when W. A. Freund, of Breslau, reported the first abdominal operation for cancer of the uterus. In the same year Freund was able to report five other cases. Von Rosthorn[1] tells us that he saw one of these patients exhibited at Breslau in 1904. The patient was well twenty-six years after the operation. This case is all the more remarkable as having been diagnosed at the Breslauer Pathological Institute as "tubular carcinoma of the vaginal portion of the cervix, with isolated cancer of the fundus." In the same year Czerny, of Heidelberg, originated and published an

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account of his method of vaginal hysterectomy for cancer of the uterus.

The effect of these publications was to stimulate a great enthusiasm among surgeons everywhere. It was found, however, that a very high primary mortality rate accompanied the abdominal method (74 per cent.—Gusserow), and that the operation by the vaginal route was much safer, having a mortality rate of 32 per cent. The greater safety in the vaginal route led for a time to a general abandonment of the abdominal method. The vaginal method was championed by Schroeder, Billroth. Martin, Mikulicz, Olshausen, Schauta, Chrobak and others.

A number of modifications of both methods were soon published. Duhrssen made lateral incisions in the vagina as far as the introitus to facilitate the removal of the parametric tissue; Schuchart's paravaginal incision was for the same purpose. Mackenrodt covered the carcinoma by flaps from the anterior and posterior vaginal walls and used the Paquelin cautery for making all incisions, constituting what he termed "igni-extirpation." This operation he later abandoned in favor of the radical abdominal method. John Byrne,[2] of Brooklyn, made high amputations of the cervix and vaginal hysterectomy with the galvanocautery. Richelot and Pean avoided ligatures and introduced the clamp method of vaginal extirpation.

The vaginal hysterectomy for cancer is still practiced by Olshausen, Chrobak, Schauta, Pozzi and others. All, however, attempt to broaden the field of operation and endeavor to imitate the radical features of the modern abdominal route. At the present time the best reports which we have of the vaginal method are those of Schauta.[3]

Combined vaginal and abdominal methods were also advocated. The type of operation described by Werder, of Pittsburg, is the best example of this class. Pawlick, in 1888, and Howard Kelly, in 1892, placed catheters

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in the ureters in order to recognize and protect them during hysterectomy.

To Emil Ries (1895) is due the credit of widening the scope of the abdominal radical operation, by centering the attention of gynecologists on the lymphatic glands. Ries asserted that over 50 per cent. of the patients operated on for uterine cancer showed involvement of the glands and proposed a free dissection of the ureters to their entire length in the pelvis, in order that the glands and parametric tissues could be removed. Rumpf and Clark, almost simultaneously with Ries, advocated the same procedures.

Wertheim of Vienna, since 1899, has made careful studies of the subject and has developed a technic of operation which has become a recognized standard for the abdominal radical method.

Bumm has made a very valuable modification of Wertheim's operation in locating the ureters more quickly through an incision paralleling the round ligament running between it and the Fallopian tube.

Mackenrodt, who has done much to perfect the operations for cancer of the uterus, introduced the transverse abdominal incision. He also sews the peritoneum from the upper part of the abdominal incision across the top of the pelvic cavity, thus rendering the operation extraperitoneal and thereby avoiding the danger of peritonitis.

Bier's method of spinal anesthesia, as soon as it became reasonably safe and practicable, was adopted for this operation by Wertheim, Doderlein, Kronig, Mackenrodt, Bumm, von Rosthorn and others. Doderlein has combined the scopolamin-morphin anesthesia with the method of spinal anesthesia for this operation, with excellent results.

Recently Werder, of Pittsburg, and Noble, of Philadelphia, have strongly advocated an abdominal method combined with the use of Downe's electrohemostasis clamps. They give as arguments for this method the

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results obtained by Byrne with the galvanocautery and the high primary mortality of the Wertheim operation.

The abdominal radical extirpation of cancer of the uterus may be said to be still in its infancy. Sufficient time has not elapsed in which to draw definite conclusions, but this fact remains, that up to the present time our experiences with operations for cancer in all parts of the body prove that an operation which gives the least number of recurrences must conform to the following general principles, namely: "the complete removal of the diseased organ, and as much of the surrounding tissues as is possible, together with the removal of the regional lymphatic glands which drain the part affected."

There exists at the present time no other disease in gynecology around which so much interest centers, or one regarding whose surgical treatment so little unanimity of opinion exists as is the case in cancer of the uterus.

This review of the literature has been undertaken with the idea of determining, as far as may be possible at the present time, what results, immediate and remote, we may hope to obtain from the radical abdominal operation, inasmuch as this method conforms, more nearly than any other, to our present conception of what an operation for this disease should be.

In making a statistical study of the results obtained with the radical abdominal operation for cancer of the uterus, we are confronted by many difficulties. The scarcity of complete detailed reports of such operations makes an ideal statistical study almost impossible. There exists no systematic or common method of reporting the cases on record, that is, whether the operation was done early or late, or whether the cancer was of the cervix, vaginal portion, or body of the uterus. There are no large series of cases on record which have been observed for five years or more, to corroborate the final results from many operators. Another difficulty which we meet is that not all operations reported as

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"abdominal operations" or "abdominal hysterectomy for uterine cancer," are really operations by the radical abdominal method. So that in making a statistical study, all reports of cases which do not possess the essential requirements of the modern radical operation must be carefully excluded. The operation may be said to be still in its period of development, and although better results are being obtained to-day with the operation than were obtained a few years ago, the final results at the present time do not represent the possibilities of the operation in the future.

Winter[4] has done much to put the statistical study of all operations for the relief of cancer of the uterus on a sound basis, not only regarding the results obtained from a radical method, but also for the purposes of comparing all methods. Winter's foundation for accurate and scientific statistics has been used by Continental surgeons, and should be universally adopted in reporting these cases. He states that in order that statistics may be of value, they must first meet two general requisites, (1) the statistics must be true, and (2) they must all be built on a similar or definite foundation. Winter insists that all types of operation must be compared and considered in respect to the following points:

1. The primary mortality.
2. The operability of all cases by the particular method.
3. The permanent results, five years after operation.
4. The percentage of absolute cures of all cases of uterine cancer presenting themselves for relief.

1. Primary Mortality.—This should include all fatal cases in which the patient would not have died immediately without the operation, that is, sepsis, heart failure, embolism, pneumonia, pyelitis, etc.

2. Operability.—Winter considers a case operable only when the radical operation has been performed. The decision as to the operability of a given case must not be based on the clinical examination alone. It can be made only after the operation has been completed,

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inasmuch as the opening of the abdominal cavity alone reveals the exact status of the condition.

A radical abdominal operation for cancer of the uterus, to be properly classed as such, must meet the following requirements:

1. The removal of the uterus and adenexa.
2. The removal of the upper part of the vagina.
3. The excision of parametria as far as they may be removed.
4. The removal of the lymph-apparatus in the vicinity of the uterus, such as the hypogastric and illiac glands.

Operators reporting such operations, who do not remove the lymph-glands, should not fail to make mention of that fact.

3. Permanent Results.—This calculation should be based on a five-year period of freedom from recurrence. It is obtained from the number of radical operations performed from which there has been previously deducted (a) primary mortality, (b) the patients lost sight of, (c) those who have died from intercurrent diseases within the five-year period. It seems to me that in the permanent results, the number of each variety of uterine cancer operated on should be specified; likewise whether the operations were undertaken early or late.

4. The Percentage of Absolute Cures.—This is estimated from the total number of patients with cancer of the uterus who present themselves for examination, and should take into consideration the inoperable cases, primary mortality and the recurrences. This calculation should also express what per cent. of all patients with cancer of the uterus who come to us for treatment have been permanetly cured by the operation. From this calculation there must be excluded, (a) patients who refuse operation, (b) those lost sight of, (c) all patients dying from intercurrent diseases before the five-year period.

Winter further states that for the purposes of statistical study, the following figures are necessary:

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1. The number of all patients with cancer of the uterus who seek relief five years before the proposed statistical study is commenced.
2. The number who refuse operation.
3. The number found to be inoperable.
4. The number who died from operation.
5. The number who could be observed after operation.
6. The number of patients lost sight of.
7. The number dying from intercurrent diseases before the five-year period.
8. The number found to have recurrence at the time of the research.

Waldstein[5] has suggested a modification of Winter's method, which consists in adding or including with the calculation of the final results, the primary mortality. The use of this modification cuts down very materially the percentage of absolute cures. Winter[6] states that he is opposed to Waldstein's method of calculation, because it is too complicated and crowds into one figure too many factors. He states that it is misleading to merge into a common figure two such divergent determining factors as the primary operative mortality and absolute cures. He further states that every step of progress with the radical operation for cancer of the uterus must, of necessity, modify the sum-total of results without seeing the particular reasons therefore and that the final result will at any rate be the same, with or without Waldstein's modification. Although both Waldstein's and Winter's methods of calculation are given in many of the statistics found in the literature of to-day, it is my impression that Waldstein's modification is unnecessary and should be omitted.

From the standpoint of malignancy, it is now generally recognized that of all the uterine cancers, the least malignant is the adenocarcinoma affecting the body, next the squamous-celled carcinoma of the vaginal portion of the cervix, and that the most malignant is the adenocarcinoma of the cervical canal. It follows that the surgical treatment of each variety will give different results and therefore, it is not exactly

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proper to consider them all together. In the literature, however, there are only a few instances in in which the different types are separated by the operators in reporting their cases of radical abdominal operation. I have found that a separate consideration of the results obtained from the radical abdominal operation in each type of cancer of the uterus is impossible, and therefore have been obliged to consider them altogether.

I have collected from the literature and from personal communication with operators in this country, reports of 2,765 instances of the radical abdominal operation which conform to Winter's formula as to what constitutes this operation. Of these 2,467 have been gathered from the continental literature, and 298 from American surgeons. The 2,467 operations which were reported are as follows:

	Cases.
Radical Wertheim operation	1,052
Radical abdominal method	689
Amman method	5
Radical abdominal operation with cleaning out of pelvis	261
Bumm-Wertheim operation	77
Freund-Wertheim operation	183
Mackenrodt-Amman operation	13
Freund	15
Mackenrodt operation	144
Complete extirpation with parametria and glands	28
Total	2,467

The reports of the 298 operations gathered from American surgeons were either reported as Wertheim operations, or in a personal communication to me, as "abdominal hysterectomies with a free dissection of the ureters and wide excision of the parametrium, the removal of a portion of the vagina and any enlarged glands present."

The status of the radical abdominal operation in America was illustrated by the replies received from 330 letters of inquiry sent to the leading surgeons and gynecologists of this country regarding the radical abdominal operation for cancer of the uterus. I received 140 replies only twenty-two of which gave the experience of operators who had done the operation. From the scarc-

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ity of the number of recorded cases in the American medical journals, and from the comparatively few reports of cases obtained from personal communication, it is evident that the modern radical abdominal operation for uterine cancer has not received the recognition in this country as it has abroad. I regret that, at this time, I have been unable to obtain late reports from Kelly, Clark, Cullen, and Ries, all of whom have had much experience with this method.

In this statistical study I have given Wertheim's results separately as well as combined with the general results of other operators. This has been done for the reason that one of the objections which has been raised to the more general employment of this method has been that other operators could not obtain results equal to those of Wertheim.

The following is a tabulated list of the cases reviewed.

TABLE 1.—STATISTICS OF THE OPERABILITY AND MORTALITY

CONTINENTAL OPERATORS

Operator.	No. Operated On.	Operability, Per Cent.	Primary Mortality. No.	Primary Mortality. Per Cent.
Amman, J. A.[7]	5	..	1	20
DeArcangelis[8]	2	..	1	..
Berutti[9 10]	...	..	..	..
Belloeuf, F., and Sorell[11]	1	..	0	..
Bergesio and Berutti[9 10]	79	..	27	..
Berkeley, C., and Bonney, V.[12 13 14]	18	67	3	16.6
Billhaut, M.[15]	4	..	3	..
Bumm[16 17]	75	90	15	20
Cheatle, Lenthal[18]	1	..	..	..
Dobbert, T.[19]	25	..	3	..
Depage, A., and Mayer, L.[20]	1	..	..	..
Döderlein[21 22 23 24]	209	48.3-68.6	30	14.3
Ernst[25]	3	..	..	..
Ferrier[16]	15	..	3	..
Freund, H. W.[20]	15	..	3	20
von Franque, Otto[27 28 29 30]	166	..	33	20
Faure, J. L.[31 32 33]	12	..	0	..
Franz, K.[34 35 36 37 38]	140	81.35	27	19.28
Fuchs[39]	2	..	0	..
Fueth[40]	1	..	1	..
Jacobs[41 42 43 44 45]	95	..	6	6.3
Blake[45]	15	..	0	..
Jeannel[46]	33	80	11	35
Jessett and Bowerman[47]	1	..	0	..
Jessnitzer and Eugen[48]	14	..	3	..
Jonnesco, T.[49 50]	28	..	9	..
Kleinhans, F.[16 51]	32	..	3	9.4
Korner, V.[52]	7	..	3	..
Kroenig[16 53 54]	47	61.7-87	2	..

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Operator.	No. Operated On.	Operability, Per Cent.	Primary Mortality. No.	Per Cent.
Klein, G.[55 56 57 58]	52	40	7	12.8
Kuestner[16 58 59]	20	68.7	4	19.4
Gattrono, S.[61]	18	..	2	..
Lampe, R.[62]	7	..	3	..
Latzko, W.[63]	10	..	0	..
Lockyer, C.[64]	12	70.5	3	..
Legeau [9]	10	..	4	..
Mackenrodt[16 17 65 66 67 68]	144	92	28	19-21
Morisani [9]	14	..	1	..
Muller, P.[53]	7	33.3-89.5	3	42.5
Opitz[69 70]	1	..	0	..
Oberlander[71]	1	..	0	..
Pfannenstiel[16]	10	..	2	20
Prelli, C.[72]	24	..	10	..
Prochownick[73]	16	..	6	..
Polosson, A., and Violet[14 74]	32	12-14-56	6	(18.7)
Poten[76]	2	..	0	..
Poroschin[77]	4	..	1	..
Reinecke, P.[78]	66	40.76	14	21.2
Reynier [9]	18	..	5	..
Ricard[16]	9	..	1	..
Richevin, R.[79]	18	..	6	..
Richelot, G. L.[80]	21	..	8	..
Rouffart[81]	1	..	1	..
Von Rosthorn and Shindler[82 83 84 1 16 85]	117	36.1	16	13.67
Spinelli[86]	5	..	1	..
Sellheim, H.*	13	..	3	..
Sitzenfrey, A.[87]	1	..	0	..
Thring, E.[88]	6	..	0	..
Veit[89]	33	..	11	..
Viannay[90]	7	..	3	40
Wertheim[75 99 100]	487	60†	119	24.50
Walthard[103]	8	..	0	..
Weiss, Th.[104]	1	..	0	..
Zacharias, P.[105]	97	..	21	..
Zweifel[16 106 107]	129	..	17	10.8

* Sellheim, Hugo: Erweiterte Freundsche Operation des Gebärmutterkrebses und Ureterenchururgie, Beitr. z. Geburtsh. u. Gynäk., 1905, ix, 413.

† In last 200 cases.

AMERICAN OPERATORS

Operator.	No. Operated On.	Operability, Per Cent.	Primary Mortality. No.	Per Cent.
Peterson, R.*	36	15 or 20	7	19
Reder, F.*	32	40	8	26.2
Jonas, J. E.*	5	50	1	20
Cannady, J. E.*	10	50	2	20
Boldt, H. J.*	5	..	..	0
Rixford, E.*	12	..	3	25
Smith, R. R.*	3	20	1	33⅓
Janvrin, J. E.*	12	10	4	33⅓
Polak, J. O.*	10	..	2	10 or 12
McLaren, A.*	7	..	11	5
Tate, M. A.*	4	15	0	..
Cumston, C. G.*	12	5	0	..
Frank, L.*	25	†	3	3 or 4
Stone, I. S.*	20	25.20	1	5
Ill, E. J.*	2	..	0	..
Poucher, J. W.*	39‡	..	3	..

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Operator.	No. Operated On.	Operability, Per Cent.	Primary Mortality. No.	Per Cent.
Gellhorn, George*	3	..	2	..
Crossen, H. S.[108]	1	..	0	..
Rosenthal, M. I.[109]	3	..	0	..
Hutchins [110]	8	50	1	12.5
Jacobson, J. H.*	7	..	2	..
Barrett, C. W.*	6	..	1	..
Cushing, E. W.*	12	25	..	..
Humiston, W. H.*	2	..	0	..
Sampson, J. A.*	14§	50	4	..

* Information given in a personal communication.
† All of body to cervix.
‡ At present all cases.
§ Since 1905.

OPERABILITY

In the 2,765 operations reported by 130 operators, I found the percentage of operability, as recorded by 28, to vary from 5 per cent. to 90 per cent. The operability percentage is decidedly higher among European surgeons.

TABLE 2.—PERCENTAGE OF OPERABILITY

CONTINENTAL OPERATORS

	Per Cent.
Berkeley and Bonney [15]	67
Bumm [16]	90
Doderlein [16 23 24]	68.6
Franz [24 25 26 27 29]	81.35
Jeannel [46]	30
Kroenig [46 53 54]	87
Klein [55 56 57 58]	40
Kuestner [16 59 60]	68.7
Lockyer [64]	70.59
Mackenrodt [56 17 66 66 67 69]	92
Muller [64]	89.5
Polosson [14 74 75]	56
Reinicke [78]	40.76
Rosthorn [23 53 54 1 111]	36.1
Wertheim [26 27 27 26 59 33 75 90 to 102]	60.0
An average operability of	65.17

The average per cent. of operability excluding Wertheim's figures is 65.54 per cent.

AMERICAN OPERATORS

	Per Cent.		Per Cent.
Peterson	20	Tate	15
Rider	40	Cumston	5
Jonas	50	Frank	25
Cannady	50	Poucher	100
Smith	20		
Janvrin	10		
An average operability of			35

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In the twenty-eight instances in which I found the operability recorded, seven had a percentage of less than 25 per cent.; 10 gave it as being between 25 to 50 per cent.; five between 50 to 75 per cent., while six gave a percentage of 75 and over. It must be emphasized that with the radical abdominal operation, a higher percentage of all cases of cancer of the uterus are operable than by any other method, and this to a large extent, explains its high primary mortality. If the radical abdominal operation was performed only in the early cases, or in cases in which a vaginal hysterectomy could be made, the operative mortality would not be considered high.

There exists a definite relation between the percentage of operability and the mortality-rate of the operation. The primary mortality is dependent, for the most part, on the degree of operability of a given case, as well as on the percentage of operability of all cases which the individual operator possesses. It is obvious that the earlier the patients are seen, the higher will be the percentage of operability and the lower the primary mortality. The operability percentage as well as the primary mortality is likewise influenced by the experience which the operator has had with the method; with a larger experience comes a greater familiarity with the technic of the operation and therefore an increase in the operability of all cases seen, with fewer deaths from the operation. These facts are well illustrated in Table 3, in which I have endeavored to ascertain the relation of operability with primary mortality, and have therefore compared operators having an operability of less than 50 per cent. with those of 50 per cent. or more.

TABLE 3.—OPERABILITY COMPARED WITH PRIMARY MORTALITY

Operators Having an Operability of Less Than 50 Per Cent.		
Operator.	Per Cent.	Per Cent.
Doderlein	48-68	Primary mortality 14.3
Jeannel	30	Primary mortality 35
Klein	40	Primary mortality 12.8
Reinecke	40.76	Primary mortality 21.21
Von Rosthorn	36.1	Primary mortality 13.67

An average operability of 38.95 per cent., with a primary mortality of 19.39 per cent.

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OPERATORS HAVING AN OPERABILITY OF MORE THAN 50 PER CENT.

Operator.	Per Cent.	Per Cent.
Bumm	90	Primary mortality 20
Franz	81.35	Primary mortality 19.28
Mackenrodt	92	Primary mortality 19-21
Polosson	56	Primary mortality 18.7
Wertheim	60	Primary mortality 24.5

An average operability of 75.87 per cent., with an average primary mortality of 20.69 per cent.

Simultaneously with the adoption of the radical abdominal operation; many authors record an increase in the operability of all patients presenting themselves for examination; thus Baisch[23] states that at Tübingen the operability of all cases of cancer of the uterus rose from 48.3 per cent. to 68.6 per cent. with the introduction of the radical abdominal operation, while Muller, in Berne, raised his operability from 33 per cent. to 89 per cent.; von Rosthorn to 36.1 per cent.; Doderlein[16] from 48.3 per cent. to 68.6 per cent.; Franz[24] from 29.2 per cent. to 52 per cent.; Kuestner[17] from 34.5 per cent. to 68.7 per cent.; Zweifel[106] to 68.4 per cent.; Kroenig[16, 54, 53] 61.7 per cent. to 87 per cent.; Polosson[14, 74, 75] 12.14 per cent. to 56 per cent.; Wertheim[90, 102] to 60 per cent. in his last 200 cases.

Von Rosthorn[14] contrasts the abdominal operation with vaginal hysterectomy and shows what influence the percentage of operability has on the primary mortality and the final results. He states that with an operability of 70 per cent. with the abdominal operation in all cases of cancer of the uterus which come to him for operation, he will have a primary mortality of fourteen, while with the vaginal route, only 40 per cent. of all cases will be operable and of these, only eight will die from the operation: in other words, in contrasting 100 cases of cancer of the uterus operated by both methods, seventy patients will be operated on by the abdominal method and, of these, 20 per cent. will die primarily; of these operated on by the vaginal method, only 40 per cent. will be operated on and 3.2 per cent. will die. Therefore, with the abdominal operation 56 per cent. recover and by the vaginal method only 36.8 per cent.

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PRIMARY MORTALITY

In the 2,765 operations tabulated, there were 538 deaths, a gross primary mortality of 19.45 per cent. This percentage agrees in the main with what has heretofore been generally considered as the primary mortality, namely about 20 per cent.

The Continental surgeons in 2,467 operations had 492 deaths, a primary mortality of 19.94 per cent., which, exclusive of Wertheim's cases, was 13.79 per cent. The American surgeons in 298 operations, had forty-six deaths or a primary mortality of 15.77 per cent.

The gross mortality of all the operations recorded is necessarily high, yet not so high as one might expect from so formidable an operation in the hands of so many different operators. The following list further shows that in individual instances, the primary mortality is much below the average, as for example:

Döderlein	in	209	operations had	30	deaths or 14.3	per cent.
Jacobs	in	95	operations had	6	deaths or 6.37	per cent.
Kline	in	52	operations had	7	deaths or 12.8	per cent.
Zweifel	in	192	operations had	17	deaths or 10.8	per cent.

Koblank[17] writing in 1908, compiled the statistics of twenty operators and collected 1,009 cases with 157 deaths or an average primary mortality of 15.5 per cent. In addition to this, Koblank gives a summary of the results of seven operators from whom he collected 298 cases with sixteen deaths, or an average primary mortality of 5.4 per cent.

Winter[112] in 1901, collected 134 cases from the German operators with thirty-three deaths, giving a primary mortality of 24.6 per cent.

Shieb,[27] in 1909, cites the primary mortality of other operators.

Von Rosthorn	in	33	operations had	2	deaths or 6	per cent.
Kleinhaus	in	32	operations had	3	deaths or 9.3	per cent.
Klein	in	16	operations had	3	deaths or 18.7	per cent.
Wertheim	in	120	operations had	22	deaths or 18.3	per cent.
Von Franque	in	66	operations had	11	deaths or 16.6	per cent.
Döderlein	in	26	operations had	4	deaths or 15.3	per cent.
Bumm	in	56	operations had	10	deaths or 17.8	per cent.
Schindler	in	117	operations had	16	deaths or 13.6	per cent.

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More recent statistics:

Döderlein in	40 operations had	2 deaths or	5	per cent.
Kroenig in	47 operations had	2 deaths or	4.2	per cent.
Wertheim in	53 operations had	3 deaths or	5.6	per cent.
Veit in	20 operations had	0 deaths or	0	per cent.

Berkeley[14] collected full statistics of 229 cases of true Wertheim operation from different operators in the United Kingdom.

Wertheim operation in early	cases worked out at	6.8	per cent.
Wertheim operation in moderately early	cases at	8	per cent.
Wertheim operation in advanced	cases worked out at	26.7	per cent.

The total mortality of the 229 Wertheim operations which he had collected was 18.3 per cent; of his own cases 16.6 per cent.

Although of the greatest importance, I have, on account of lack of detailed data, been unable to tabulate and contrast the results of the cases which have been operated early with those which have been operated late. The percentage of operability has a relative bearing on these questions and has been considered above.

I have been able to find a number of references illustrating the fact that with an increased experience, individual operators have had a corresponding decrease in the primary mortality rate.

Bouvier[113] 1904, states that Mackenrodt in his last twenty-one cases had two deaths or 9.5 per cent.

Baisch[22] 1905, reports that the primary mortality in Döderlein's cases was 15 per cent., and that in his last forty-five cases it decreased to 6.6 per cent. Bergesio[10] states that from 1898 to 1906, the Wertheim operation was done by himself and Berutti, seventy-nine times, if we divide the time of these operations into three-year periods, we have the following figures:

1898 to 1900,	20 operations with	9 deaths,	primary mortality 45 %
1901 to 1903,	32 operations with	11 deaths,	primary mortality 34.5%
1904 to 1906,	27 operations with	7 deaths,	primary mortality 26 %

Von Franque,[28] 1909, reports 166 operations with a 20 per cent. primary mortality.

In 1905 he made	38 operations with	primary mortality of 13%
In 1906 he made	42 operations with	primary mortality of 26%
In 1907 he made	44 operations with	primary mortality of 16%

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He had series of cases, as many as eighteen consecutively, without a death. Von Franque, however, does not think it will be possible to reduce the mortality as low as 10 per cent.

J. L. Faure[31] writing in 1906, reports the following figures:

First series (15 operations) 9 deaths (primary mortality of 60%)
Second series (18 operations) 6 deaths (primary mortality of 33%)
Third series (7 operations) 1 death (primary mortality of 14%)

Scheib[27] gives the figures presented in Table 4 by years, containing the number of patients with cancer of the cervix who died primarily from operation as well as the total who came to operation, including the number of attempts at operation where the radical operation could not be completed.

TABLE 4.—OPERATIONS AND MORTALITY IN SCHEIB'S CASES

Year.	No. Cases.	Inclusive Attempts.	Deaths No.	Deaths Per Cent.	Deaths Inclusive Attempts at Radical Operation.
1903.....	15	17	4	26.6	5 or 29.8 per cent.
1904.....	22	25	4	18.1	5 or 20 per cent.
1905.....	35	38	5	14.2	5 or 13.1 per cent.
1906.....	39	42	10	25.6	11 or 26.1 per cent.
1907.....	38	44	7	14.4	7 or 15.9 per cent.
	149	166	30	20.1	33 or 19.8 per cent

E. Wertheim[103] (1902) gives the following figures:

Primary results of his first 30 cases, 12 deaths
Primary results of his second 30 cases, 5 deaths
Primary results of his third 30 cases, 3 deaths
Primary results of his fourth 30 cases, 4 deaths

His total mortality is 20 per cent. and, if we exclude the first thirty cases on account of imperfection of technic, his later ones give a primary mortality of only 13 per cent. Wertheim[27] stated at the 1909 International Congress, at Budapest, that in his last 200 cases, the primary mortality was only 10 per cent.

R. Peterson (1910) reports a primary mortality in his first series, of 14 cases, 42.8 per cent.; in his second series, of 22 cases, of 4.5 per cent.

Schindler[85] 1904, reports that, at von Rosthorn's clinic, in twenty-five operations performed from Jan. 1, 1903.

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to April 1, 1904, there were only two deaths or a mortality of 8 per cent.

CAUSES OF DEATH

The causes of death from the radical abdominal operation for cancer of the uterus are given as shock, peritonitis, infection, sepsis and injury of the ureters.

I have been able to find in the literature, only eighty detailed cases of death which were directly traceable to the operation. The relative frequency of each cause is illustrated in the following list of causes:

Infection and sepsis	31
Peritonitis	19
Total	50
Shock	18
Injury of the uterers	2
Pneumonia	2
Nephritis	2
Anemia	2
Paralysis of the heart	1
Fatty degeneration of the heart	1
Pulmonary embolism	1
Necrosis of the ureter	1
Total	80

This list shows the relative high frequency of deaths due to infection, sepsis and peritonitis, fifty out of the eighty cases being due to these causes. Shock ranks next in relative importance as a cause of death, there being eighteen cases.

The most potent argument which has almost universally been used against the employment of the radical abdominal operation in the surgical treatment of carcinoma uteri, has been the high primary mortality which accompanies the operation. That the operation is correct in theory, and is the only one which conforms to our modern conception of the pathology of the disease, seems to be universally agreed; but its high primary mortality has not only deterred many operators from performing it, but has led to its abandonment by some who had already adopted it.

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Those who make the criticism that the primary mortality of the operation is too high must not forget that the history of all major abdominal operations, in their period of development and perfection, have been accompanied by a higher mortality, and that such death-rates should not be taken as final.

SUMMARY OF THE REVIEW OF THE PRIMARY MORTALITY

1. In the 2,765 operations tabulated there was a primary mortality of 19.45 per cent.

2. The average percentage of primary mortality among Continental surgeons was 19.94 per cent. and among the American operators 15.77 per cent.

3. In individual instances the deaths from this operation have been reduced considerably under the general average, Jacobs 6.37 per cent., Zweifel 10.8 per cent., Kline 12.8 per cent., Wertheim in last 200 cases 10 per cent, and Doderlein 14.3 per cent.

4. The primary mortality is much lower when the operation is made before the disease has advanced too far. According to Berkeley in early cases the primary mortality is only 6.8 per cent., as compared to 26.7 per cent. in late cases.

5. The relatively high primary mortality of this operation is largely due to the greater number of cases operable by this method, the result being that cases are operated in a stage too far advanced for the employment of any other method of operation.

6. Death from this operation seems to be due in most instances to infection and sepsis and not as a rule to shock as is generally supposed to be the case.

The infection is, in all probability, the result of the presence of pyogenic bacteria in the carcinomatous mass and large area of raw surface exposed during the operation.

Shock may be due to any one or more of the following causes:

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1. Inaccessibility of the deep pelvic structures, causing rough manipulations.

2. Manipulation and exposure of the abdominal viscera, particularly the small intestines.

3. Hemorrhage.

4. Prolonged operation with subsequent prolongation of the anesthesia. All of these dangerous factors for the most part are eliminated when spinal anesthesia is employed, either alone or when combined with a general anesthetic.

Spinal anesthesia is especially adapted for this operation. When it is employed the abdominal muscles are temporarily paralyzed and are extremely relaxed. As soon as the incision is made and the pelvis of the patient elevated, the intestines, curiously enough, gravitate away from the field of operation. Thus, the parts to be operated on are rendered accessible and manipulation of the small intestines is reduced to a minimum. Spinal anesthesia also materially shortens the time of operation and permits a more accurate hemostasis, preventing in this way, to a great extent, the danger of secondary hemorrhage.

To me the most important feature of spinal anesthesia is the prevention of shock, by "blocking" of the cord. Thus the afferent impulses or sensations produced by the operation cannot be referred to the peripheral vasomotor centers and nerves and thus produce shock. The same state of affairs prevails as it does in Crile's method of "nerve-blocking" in amputations of the thigh, only it exists on a larger scale.

Even in those cases in which it is necessary to complete the operation with a general anesthetic, the good effect of the spinal anesthesia, namely, relaxtion of the abdominal walls, and "blocking" have prevented postoperative shock, and any increase in the pulse-rate.

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FINAL RESULTS

It is too early at the present time to obtain a large amount of corroborative information regarding the end results of the radical abdominal operation. This is due mainly to two reasons: (1) the operation is still in its period of development, and (2) in only a few instances have operators been performing the operation for a sufficient length of time to have series of cases which have been observed for five years after the operation.

The following reports as they exist in the literature, together with the personal reports which I have been able to obtain from some of the American operators, represent the end results with the radical abdominal method as near as they can now be determined:

Bergesio and Berrutti[10] reported 1906, their final results in 20 operations performed from 1898 to 1900; 3 patients were alive two years after operation: 1, three years afterward, and 2, four years afterward; 11 were unaccounted for and 4 patients had relapsed and died in periods ranging from six months to twenty-two months after operation; 33 per cent. were alive from one year and ten months to four years.

Bumm,[16] reporting in 1907, was able to trace fifty-six women out of seventy-five in whom he had made the radical abdominal operation. Thirty per cent. were alive more than one year after operation.

Dobbert,[19] in 1907, out of twenty-five radical abdominal operations, gives the end results in eleven. Seven patients are free from recurrence one to four years after operation (35.7 per cent.).

Döderlein,[16] in 1907, reported forty-seven radical abdominal operations which he performed in 1902. Of the patients fifteen were free from recurrence three and one-half to four and one-half years after operation (31.9 per cent. Waldstein, 37.5 per cent. Winter); fifteen of these operations were made for cancer of the body of the uterus, which gave a primary mortality of 6.6 per cent., with an operability of 100 per cent. and a percentage of

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cure, after Winter, of 72.7 per cent. (or 53.3 per cent. after Waldstein). The thirty-two cases of cervical cancer gave an operability of 60.3 per cent., a primary mortality of 18.7 per cent., with permanent cure in 26.9 per cent. after Winter and 21.8 per cent. after Waldstein; an absolute cure of all cases observed three and one-half to four and one-half years after operation 16.2 per cent. were after Winter, 13.1 per cent. after Waldstein. He contrasts this with the end results of vaginal hysterectomy at Tübingen, which was only 9 per cent.

In 1903 Döderlein performed thirty-six radical abdominal operations, thirty-three for cancer of the cervix and three for cancer of the body. Of the patients twelve were cured two and one-half to three and one-half years after operation, or a permanent cure of 41.3 per cent. (Winter) and an absolute cure of 24.9 per cent. (Winter); of the cervix cases, only a permanent cure of 40 per cent. (Winter) with an absolute cure of 22 per cent. (Winter).

Ernst,[25] in 1907, wrote that after three Wertheim operations two patients were alive without recurrence two and one-half years and one year after operation.

Faure,[32] in 1908, states that of twelve patients who survived a radical abdominal operation during 1902 to 1905 for cancer of the cervix, all are still in perfect health, an average cure of four years and four months.

Von Franque,[28] reporting in 1909, gives his results by comparing the operations in the years of 1904 and 1905 with reexaminations in 1907.

TABLE 5.—RESULTS REPORTED BY VON FRANQUE

A. PERMANENT RESULTS

	1904 (3 years).	1905 (2 years).
Number operated on	22	29
Died from operation	4	4
Died intercurrent	11	0
Lost sight of	0	1
Remaining	17	24
Free from recurrence	10	15
Permanent cure percentage of the remaining (Winter)	58.8	62.5
Permanent cure percentage of the operated ones (Waldstein)	47.6	53.5

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B. Absolute Percentage of Cures

	1904 (3 years).	1905 (2 years).
Number of cases	125	87
Operation refused	25	9
Lost sight of	0	1
Died intercurrent	1	0
Calculable cases	99	77
Of these inoperable	79	64
Of these operable	21	36
Died from operation	4	4
Recurrence	7	9
Inoperable	78	49
Free from recurrence	10	15
Absolute percentage of cures (Winter)	10.1	19.4

Franz,[37] in 1908, reports that he personally has operated on 124 patients in which he has made the radical abdominal operation. He has had, up to 1908, about 44 per cent. of recurrences and believes that the actual permanent cures would be about 25 per cent. Franz has also operated twenty times for recurrences after the radical abdominal operation and states that of these, two had died from the operation and that three have thus far been spared any recurrence.

Jacobs,[42] in 1905, gives a summary of his 95 cases in which he made the radical operation, as follows:

During the first year there were 48 recurrences or 50 per cent.
During the second year there were 20 recurrences or 21 per cent.
During the third year there were 4 recurrences or 4.2 per cent.
During the fourth year there were 2 recurrences or 2.1 per cent.
During the fifth year there were 2 recurrences or 2.1 per cent.
During the sixth year there was 1 recurrence or 1.05 per cent.

In the discussion of this paper Miss Aldrich Blake stated that out of her fifteen cases of radical abdominal operation for cancer of the uterus, she knew that three were without recurrence after a period of three years.

Jeannel,[46] in 1908, gives the results of his thirty-three operations as follows:

Primary mortality of eleven; twenty-two left the hospital and of these twenty-one have been heard from.

There were eleven recurrences as follows:

Seven recurrences during the first year
Two recurrences during the second year
One recurrence during the third year
One recurrence during the fourth year

There were 10 patients alive and without recurrences, as follows:

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1	has been	operated	on 8	years	and 7	months
1	has been	operated	on 6	years	and 8	months
1	has been	operated	on 5	years	and 8	months
1	has been	operated	on 5	years	and 2	months
1	has been	operated	on 5	years	and 1	month
1	has been	operated	on 5	years	and 0	months
1	has been	operated	on 4	years	and 2	months
1	has been	operated	on 3	years	and 1	month
1	has been	operated	on 1	year	and 11	months
1	has been	operated	on 1	year	and 1	month

Lockyer,[64] in 1907, reported the final results in twelve cases. Six patients were totally free from recurrence for a period of about two years. There was a primary mortality of four and two died of recurrences.

Mackenrodt,[68, 53, 27] in 1908, reports that among 144 patients operated on by his method, who were observed eighteen months to six and one-half years after operation, there were 61.5 per cent. of all or 74 per cent. of the surviving patients still well. The primary mortality in the last few years has been between 19 and 21 per cent. in an operability of 92 per cent.

Absolute cure	18	months	to 6½	years,	55.6 per cent.
Absolute cure	3½	years	to 6½	years,	52.6 per cent.
Absolute cure	4½	years	to 6½	years,	45.4 per cent.
Absolute cure	5½	years	to 1½	years,	58.3 per cent.

Polosson[75, 14, 74] reported in 1907 that after thirty-two radical abdominal operations for uterine cancer, 60 per cent. of the patients were alive after five years.

Reinecke,[78] in 1909, reports the final results in sixty-six cases. Up to the end of 1903 twenty-seven radical abdominal operations were made for cervical cancer. Of the twenty surviving patients, seven are still free from recurrence, making a permanent cure of 35 per cent.

Recurrences were as follows:

First	year	there were	23	recurrences
Second	year	there were	5	recurrences
Third	year	there were	3	recurrences
Fourth-Fifth	year	there were	0	recurrences

Enlarged glands were removed in twenty-six of the sixty-six cases; in twelve instances they were found carcinomatous; all cases, excluding the primary deaths, recurred, with one exception, in which the glands had been found carcinomatous, or in which carcinoma-like cells were found.

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Richevin[79] operated in eighteen cases by radical abdominal operation from 1902 to 1905, with six deaths. Of the twelve patients who left the hospital, one has been lost sight of; one showed an immediate recurrence; one died from recurrence twenty-three months later. The remaining nine are living.

One is cured 1 year and 4 months
One is cured 1 year and 6 months
One is cured 2 years and 6 months
One is cured 3 years
One is cured 3 years and 6 months
One is cured 3 years and 8 months
One is cured 4 years and 2 months
One is cured 4 years and 7 months
One is cured 4 years and 8 months

The one who has been cured one year and six months was operated on early; vaginal portion of uterus. All the others were advanced cases.

Von Rosthorn[85] reported by Schindler in 1906 thirty-three abdominal radical operations. Twenty-seven patients have been observed for a period of five years and six for a period of four years. Seventeen patients have had recurrences and five have remained well. This makes 77.2 per cent. of recurrences with a permanent cure of 22.7 per cent. The absolute cure of all patients is found, in an operability of 46 per cent. and a primary mortality of 9.09 per cent., with a permanent cure of 22.7 per cent., to be 2.65 per cent. Of the cases in which glandular metastasis were noted, all have recurred except one. Considering the twenty-seven patients who have been observed for five years and who were operated on in 1899 and 1900, there are twenty cases, after deducting the primary mortality and the otherwise dead and lost patients. In these there have been 16 recurrences (or 80 per cent.) and four (or 20 per cent.) free from recurrence.

Veit,[89] writing in 1910, states that out of thirty-three radical abdominal operations performed in 1904 for uterine cancer with a primary mortality of eleven cases, nine patients are now living, and, among these, one from whom probable carcinomatous glands were removed.

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Wertheim,[27, 102] at the last International Medical Congress, 1909, at Budapest, reported the final results in 487 operations by this method; 200 patients have been operated on more than five years ago. The primary mortality was 24.5 per cent. and the absolute cure in all cases 19.3 per cent. In the last series of cases the primary mortality has been lowered to 10 per cent. and the operability has risen to 60 per cent., so that Wertheim states that he expects an absolute cure, in all cases observed of 30 per cent. The accuracy of his statistics is demonstrated by the fact that none of his cases were lost from observation. At the Kiel congress, in 1905, Wertheim reported 60 to 70 per cent. of permanent cures (Winter) after five years, and at the Dresden congress, in 1907, he reported 120 radical abdominal operations the patients having been observed for five years after operation, among whom there was a permanent cure of 58.6 per cent. (Winter).

Zweifel,[16] reporting in 1907, traced fifty-five women on whom he had made the radical abdominal operation for cancer of the uterus. He classifies results as follows: In twenty-three operations in which a favorable prognosis was made at the time of operation, fifteen patients were traced from five months to two years and found free from recurrence. In three operations in which an unfavorable prognosis was given, two patients are alive fifteen and twenty-one months after operation without recurrence. In twenty-nine operations in which a bad prognosis was made, nineteen patients were alive in periods from one year to three years and four months after operation without recurrence of the disease.

The summary of permanent results of continental operators is as follows:

Three operators report 20% to 30% of cures from 1 to 5 years
Seven operators report 30% to 40% of cures from 1 to 8 years
Three operators report 40% to 50% of cures from 1 to 5 years
One operator reports 50% to 60% of cures after 3 years
Five operators report 60% to 74% of cures from 1 to 6½ years

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Operators reporting permanent cures five years after operation are as follows:

Von Rosthorn	20	per cent.
Veit	30	per cent.
Wertheim	58.6	per cent.
Polosson	60	per cent.
Reinicke	35	per cent.

Average of the five operators, 40.72 per cent.; permanent cures five years after operation.

Average of the American operators, 8.39 per cent.; permanent cures five years after operation.

From the 298 radical abdominal operations by American operators there were forty-six deaths (15.77 per cent.) of the 252 survivors, seventy-eight are still free from recurrence and twenty-five or 8.39 per cent. are alive and well five years after operation, as follows:

	Cure.	
Peterson	3	Permanent cure five years after operation.
F. Reder	2	Permanent cure five years after operation.
E. Rixford	2	Permanent cure five years after operation.
J. E. Janvrin	2	Permanent cure five years after operation.
J. O. Polak	1	Permanent cure five years after operation.
C. G. Cumston	3	Permanent cure five years after operation.
J. W. Poucher	6	Permanent cure five years after operation.
C. W. Barrett	2	Permanent cure five years after operation.
Emil Ries	4	Permanent cure five years after operation.
	25	

The following is a summary of absolute cures:

Mackenrodt,[98] 58.3 per cent., 5½-6½ years after operation.
Wertheim,[102] 19.3 per cent., 5 years after operation.*
Döderlein,[16] 1902, 16.2 per cent., 2½-3½ years after operation.
Döderlein,[16] 1903, 22 per cent., 2½-3½ years after operation.
Von Franque,[98] 10.1 per cent., 3 years after operation.
Von Franque,[98] 19.4 per cent., 2 years after operation.
Von Rosthorn,[98] 2.65 per cent., 5 years after operation.
* Awaits returns from 80 per cent.

The advisability of removing enlarged and carcinomatous glands, when such are found at the operation, is still one of the mooted questions in the performance of radical abdominal operation. While most operators agree that when such enlarged and carcinomatous glands are found, a recurrence is the rule, and in spite of the fact that Wertheim and others consider the wide excision of the parametria as the all-important factor in the operation, the following reports of patients alive

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without recurrence five years after operations in which such carcinomatous glands were removed commands our serious consideration.

PERMANENT CURES FROM ABDOMINAL OPERATION IN WHICH CARCINOMATOUS GROWTHS WERE REMOVED

Emil Ries,[14] in 1906, reported four cases in which carcinomatous glands were removed at the time of operation; the patients were free from recurrence five years after operation.

Döderlein[10] has two patients with carcinoma of the cervix who were operated on in 1902, with simultaneous removal of carcinomatous glands, who have remained free from recurrence four and one-half years. He also has three other patients, operated on in 1903, who have remained free from recurrence for three to three and one-half years.

Wertheim[16] has had four similar cases with freedom from recurrence from three to three and one-half years after operation.

Mackenrodt[16] had eighteen cases of radical operation with the removal of carcinomatous glands which, as reported by Brunet, are as follows:

Three	cases in 1901,	1 patient	remaining well without recurrence
Four	cases in 1902,	3 patients	remaining well without recurrence
Nine	cases in 1903,	7 patients	remaining well without recurrence
Two	cases in 1904,	1 patient	remaining well without recurrence

Von Rosthorn[85] had one case with ultimate recovery.

Bumm[85] had two cases in which carcinomatous glands were removed, in one of which the right ureter had become infiltrated with cancer which necessitated the removal of the right kidney; both patients were well after two and one-half years.

Veit[89] reports one patient alive after five years in whom the glands were probably carcinomatous.

CONCLUSIONS

From the foregoing summary we are warranted in drawing the following conclusions regarding the opera-

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bility, primary mortality, permanent results and absolute cures obtained from the radical abdominal operation for uterine cancer:

1. Among Continental operators, including Wertheim's figures, an operability of 65.17 per cent., a primary mortality of 19.94 per cent., a permanent cure from three to five years in 40.72 per cent. (five operators) and an absolute cure in all cases of 21.14 per cent. (five operators with period of observation from two to six and one-half years).

2. Wertheim's figures are an operability of 60 per cent.; a primary mortality of 10 per cent.; permanent cures after five years in 58.6 per cent., and an absolute cure of all cases in 19.3 per cent., with a probability of 30 per cent.

3. Other Continental operators exclusive of Wertheim's figures, give an operability of 65.54 per cent.; a primary mortality of 13.79 per cent.; an average permanent cure five years after operation in the hands of four other operators of 36.25 per cent., with an average absolute cure in all cases three to five years after operation in the hands of four operators of 21.44 per cent.

4. Eleven American operators give an average operability of 35 per cent.; a primary mortality of 15.17 per cent.; permanent cures after five years, 8.39 per cent. On this basis the absolute cure would be approximately 1 per cent.

In Table 6 is found a comparison of the results obtained from the radical abdominal operation with those obtained from other operations for cancer of the uterus.

From the review it is apparent that the best results in the surgical treatment of uterine cancer are obtained from radical abdominal operation. As long as these patients come for relief with the disease in an advanced stage, just so long will the percentage of operability of all cases be low and the primary mortality high, with a correspondingly low percentage of absolute cures.

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COMPARISON OF OPERATIONS FOR UTERINE CANCER

Method.	Operability.	Primary Mortality.	Permanent Cures After Five Years.	Absolute Cures.
1. Radical abdominal operation by Continental surgeons, including Wertheim.*.	65.17 per cent.....	19.94 per cent.....	40.72 per cent. (five operators).....	Average 21.14 per cent. (five operators with a period of observation from 2-6½ years).
2. Wertheim's results.**.....	60 per cent. in last 200 cases.....	10 per cent. in last 200 cases.....	58.6 per cent. (Dresden Congress, 1907).....	19.3 per cent.; awaits 30 per cent. on account of increase in operability.
3. Radical abdominal operations by Continental surgeons, not including Wertheim.***.....	65.54 per cent. (Continental Surgeons).....	13.79 per cent. (Continental Surgeons).....	36.25 per cent.; average of 4 European Surgeons.....	Average 21.40 per cent. (four operators 3 to 5 years after operation).
4. Extensive vaginal hysterectomy, Schauta.†..	47.7 per cent.....	10.7 per cent.....	39.5 per cent.....	13.4 per cent.
5. Vaginal hysterectomy.††.....	25 to 40 per cent.....	8 to 10 per cent.....	Lasting results in 33⅓ per cent., Gusserow, 1890-1900 (ca. cervix), 24.4 per cent. (ca. body), 100 per cent....	7 to 10 per cent.
6. Byrne's operation, 237 cases, 151 lost sight of.‡	100 per cent.....	Nil.....	Three years after operation (65 cases), 17.71 per cent.; five years after operation (46 cases), 12.53 per cent..	Three years after operation 17.71 per cent.; five years after operation (46 cases), 12.53 per cent.

* Compilation by the author.
** Internat. Med. Cong., Budapest, 1909.
*** Compilation by the author.
† Internat. Med. Cong., Budapest, 1909.
†† Döderlin-Kronig, 1907.
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The real problems at the present time in the surgical treatment of uterine cancer are not what particular operation gives the best results, but, rather, how such patients can be operated on earlier and how the primary mortality of the radical abdominal operation can be further reduced.

The first problem can be solved only by a campaign of education in our medical schools and in our medical societies, together with some form of public instruction similar to that which has been inaugurated in Germany by Duhrssen and Winter. The problem of reducing the primary mortality is one which I believe will be solved largely in the next few years. Further experience with the technic of the operation, the use of spinal anesthesia, perhaps the more general employment of Mackenrodt's transverse abdominal incision, Bumm's modification of Wertheim's technic for quickly locating the ureters, further experience with implantation of the ureters in the blader, diminution of the exposure and manipulation of the viscera, and the diminution of the dangers from hemorrhage either by Momburg's method or by temporarily clamping the internal iliac arteries, are some of the methods and procedures which, when combined with an early operation, will help toward solving this problem.

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THE DIAGNOSIS OF OPERABILITY OF CARCINOMA OF THE CERVIX OF THE UTERUS

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Operability is a condition dependent on the operator as much as on the patient. This obtains as much in operations for fibroids as in operations for carcinoma. What to one operator is an inoperable fibroid, presents to the other a moderately difficult task. In carcinoma the personal factor enters even more into the determination of operability. I know of surgeons who refuse to operate in any case of carcinoma of the cervix; others who will do only operations which have a low primary mortality; others again whom no amount of primary mortality can deter from the most desperate attempts. Each one of them has his own conception of operability, which, expressed in figures, would vary between zero and 80 per cent. of all cases.

Operability to one surgeon appears to be the condition in which it is possible to take out the carcinomatous uterus. Such a surgeon would probably have a percentage of operability approaching 80 per cent. Other surgeons have no faith in surgical operations for carcinoma, either because they have not operated sufficiently extensively and have had a shocking number of recurrences, or have done poor surgery and have had a mortality following their operations which precluded further efforts on their part. This class sometimes hides behind the oft-repeated statement that it is no use to operate on carcinoma anyhow, because in those cases that were really carcinoma recurrence always follows and those in

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which recurrence does not take place were not really carcinoma, microscopic diagnosis nothwithstanding.

To find some foundation on which to base a scientific discussion, it is necessary to recall a few generally accepted results of clinical experience and pathologic investigation.

First, the diagnosis of carcinoma must be based on microscopic evidence. This evidence, I am happy to say, is now so generally accepted that the statements concerning microscopic diagnosis which a few years ago resounded from prominent rostrums need no further refutation. It is sufficient to repeat that it is not the microscope or the stain or the method of imbedding or cutting which makes the diagnosis, but the man who looks through the microscope.

Second, in cases which have been diagnosed as carcinoma by reliable microscopic investigation the patients have been cured by operation in numerous instances and have remained cured for many years after the operation. Therefore it is certain that cases of carcinoma can be cured by operation.

INDICATIONS AND CONTRAINDICATIONS FOR OPERATION

The cases which give the best chances of a complete cure by operation are the cases in which the carcinoma is small and limited in extent. These cases give the best chances because the operations can be done in freely movable tissues and without sepsis being present in the field of operation; therefore with low primary mortality. Furthermore, the chances of removing all of the carcinoma are good, therefore the remote results are satisfactory.

The cases which give the most unfavorable results are those in which the carcinoma has involved the tissues extensively, and in which infection of the disintegrating tissue has taken place. These cases are bad risks for both primary mortality and remote results.

It is evident that every carcinoma has a stage when it is in its beginning and when its operative cure would

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be safe and lasting. It is regrettable that only a pitifully small percentage of such cases reach the operator. Somebody is to blame in every case in which this stage has been allowed to pass unrecognized and unoperated. If we are charitable, we are willing to assume that in most cases the patient herself is to blame, who through ignorance, superstition, fanaticism or fear commits suicide by the carcinoma route. If we are less charitable and more inclined to criticism, we remember the many cases in which the physician is to blame who fails to make the diagnosis.

Once this ideal stage of carcinoma, if I may so call it, is passed, the carcinoma patient reaches a condition in which many factors enter into the determination of her chances and in which conscientious and able surgeons may vary widely in their individual opinions.

This much we may hope to maintain, that every operation for the removal of carcinoma is undertaken with the hope and intention of removing all of the carcinoma, and that any operation which fails to remove all of the carcinoma is a failure, whether the patient survives it or not. If the patient survives an operation for carcinoma which fails to remove all of the carcinoma, her condition is not essentially different from that of the woman whose carcinomatous uterus has not been removed, but only curetted and cauterized. And the chances of the two are nearly equal as far as length of life after the operation is concerned (an average of eighteen months with wide, but exceptional variations above and below that average).

There is no question that with modern methods of hemostasis it is possible to remove almost any uterus affected with carcinoma, but it is also beyond question that this kind of operation is a perfectly useless sort of tightrope performance; and let it be understood clearly, that it is the patient who is made to walk the rope, not the surgeon.

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When it appears impossible to eradicate the disease completely by operation, the patient is better off with a simple palliative operative treatment. Palliative slight operations achieve nothing but a mitigation of the living death, but they do not render surgery abhorrent to the next patient who may be a good risk.

From what we know about the lawless ways of carcinoma of the cervix, it becomes clear that the more of the tissue surrounding the original seat of the carcinoma is removed the greater the chances of removing all of the carcinoma and of accomplishing a lasting cure. Unfortunately, the primary mortality increases in direct ratio with the extent of the operation. Furthermore, the cervix is in a particularly unfavorable location for wide excision of the surrounding tissues. In general we desire to keep at least an inch from the carcinoma in our operations. Who can do that in the structure attached to the cervix in front, the bladder? And who has the courage to advise complete removal of the posterior wall of the bladder with resection and reimplantation of the ureters in every operation for carcinoma of the uterus? Furthermore, the extension of the carcinoma of the cervix along the lymphatics is particularly treacherous, the paths leading underneath the apparently intact vagina, sometimes to considerable distances, and through apparently intact broad ligaments to lymphatic glands inside and outside the pelvis.

With all these obstacles which threaten our results, we must keep in mind that the farther away from the primary carcinoma we keep with our excision, and the farther away from the primary carcinoma we head off the outposts of the carcinoma the greater the certainty of a lasting result.

OPERATION

The operation which I have had the honor to propose to the profession in 1895, and which has since been modified and moderated and variously called the exten-

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sive Freund operation or the Wertheim operation, was the result of these and similar considerations. The intention was to keep as far away from the primary seat of the carcinoma as possible, to remove not only the primary carcinoma, but all of the surrounding tissues to an extent which would include the most probable first metastatic outposts, and at the same time to evolve a technic which would give a fair chance to the patient to survive the necessarily extensive operation. My first imitators had a mortality which soon made them more conservative, and at the present time, as far as I can ascertain, I am still the most radical operator, with the result that all of the patients who have left the hospital after a complete operation are to-day alive and free from pelvic carcinoma.

SUMMARY OF RESULTS

I have treated between 1897 and the end of 1909 33 patients with carcinoma of the cervix. Eleven of these were too far advanced for anything except palliative treatment. Of the 22 operated on 8 died from the operation, 2 from hemorrhage, 2 from the anesthetic, 4 from septic conditions. Of the 14 surviving the operation, 2 were operated on incompletely, the operation being interrupted when it was found impossible to complete it. Of the 12 with completed operation, one on examination of the specimen proved to be carcinoma just above the cervix and therefore belongs among the carcinomas of the body. One patient whom I reported to the Boston meeting of the American Medical Association as having had a recurrence in the external inguinal glands under the skin nine years after the first operation, I lost track of one year after the second operation. She was therefore alive ten years after the first operation. She belongs to the submerged stratum of society and I have little hope of finding her again. The 10 known survivors were operated on as follows: 1908, one; 1899, one; 1900, one; 1901, two; 1903, one; 1906, one; 1908,

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one; 1909, two. The number is so small that it is hardly worth while to figure out percentages. Suffice it to say that out of 17 who came to treatment from thirteen years to five years ago, 14 have been operated on by the radical operation, 1 has been lost sight of, 1 was carcinoma of the body, 6 died and 6 are alive and well today; 1 twelve, 1 eleven, 1 ten, 2 nine, 1 seven years.

After this operative experience and the pathologic study of the specimens removed, the principles which I announced in 1895 remain unchanged. But I must repeat that the value of this operation lies rather in the possibility of more numerous, complete and lasting cures of favorable cases than in the possibility of operating on advanced cases which are not amenable to treatment by the older methods.

Carrying out this operation I found, as was to be expected, that certain cases are inoperable which formerly would have been considered operable. On the other hand, certain classes of cases were demonstrated as amenable to operation which formerly were regarded as hopeless, as will appear in the further discussion.

Coming to the more technical points of this discussion, it may be said that there is no case which is inoperable for the palliative methods. Even those patients who cannot safely take an anesthetic can be submitted to this palliative treatment, as it can be carried out without an anesthetic or with a little morphin, in practically all cases.

The radical operation as I practice it, is a severe and dangerous operation in itself, even where the conditions are reasonably favorable as far as the extent of disease is concerned. Patients who are very anemic in consequence of prolonged and severe hemorrhages stand the anesthetic poorly and are poor risks even with scopolamin-morphin or spinal anesthesia. If preparatory treatment of short duration directed towards raising the hemoglobin percentage and the red blood count is not

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rapidly successful, the danger is considerable. Short stout patients of stocky frame are hard to operate on. Even tall patients, when very obese, offer great obstacles and the operation is liable to be extremely difficult and long, and therefore risky. Patients with nephritis, chronic bronchitis and emphysema and valvular lesions of the heart are in special danger. Preparatory treatment should be tried in these cases for a short time. If it is not rapidly successful the patient should be informed of the additional risk she is running. I have repeatedly operated on patients with well-compensated heart-lesions without bad results.

The bacteriology of the carcinomatous surface is of great importance. Practically all carcinomas contain micro-organisms of varying degrees of virulence. The danger of infecting the pelvic connective tissue and the peritoneum is always present in spite of various technical precautions which have been advised. It is safe to say that it is impossible to render an infected carcinomatous ulcer aseptic, whatever the preparatory treatment may be. The carcinomatous area may be opened into in the course of the operation, if the uterus tears, and carcinomas of the cervical canal are particularly treacherous in this respect. In order to lower the primary mortality it has been advised to give preparatory treatment to the septic carcinomatous areas for weeks, if necessary, before the main operation. But it is not safe to let a carcinoma go on for weeks, because in the course of these weeks it may become hopelessly inoperable, even if a little cleaner on the surface. In addition it must be stated that preliminary curetting and cauterizing in itself is not without danger. It is often followed by rise of temperature, sometimes even by exudates, which may render the radical operation impossible, Preparation of the carcinoma the day before the main operation or immediately preceding the main operation seems to be the best method. Patients who develop high temperature and septic con-

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ditions if prepared one day before the intended main operation, are best left without operation.

DIAGNOSIS OF EXTENT OF INVASION

The extent of the neoplasm is of necessity of prime importance with regard to the operability of the case. It is diagnosed before, during and after the operation, and often the result of the investigation at one of these periods is vastly at variance with that at another period.

Before the operation the methods used in the diagnosis of the operability of the carcinoma are inspection in the speculum, palpation, vaginal, rectal, abdominal and combined, and lastly cystoscopy.

The speculum is mentioned only to be condemned as practically useless. Cystoscopy should theoretically give safe indications, but does so only in a very limited way. If the cystoscope shows that the carcinoma has grown through into the bladder, it has been of value, because it shows the case to be inoperable. But the other conditions found in the bladder, edema, bullous edema and distortion of the bladder, are not reliable. They may be due as much to the infected condition of the carcinoma as to carcinomatous invasion of the bladder itself. Unless the cystoscope shows actual involvement of the bladder mucosa, the case need not be considered inoperable until further investigation.

Vaginal palpation of the carcinoma, especially after as much of the neoplasm as possible has been removed with the curette, shows the involvement of the uterus and surrounding tissues with a reasonable amount of accuracy. Extensive involvement of the vagina especially if extending into the depth, extensive destruction of the cervix, especially if involving the broad ligaments, characterize the case as inoperable. Palpation through the rectum may reveal thickening and rigidity of the ligaments which might make the operation useless. Palpation of the glands in the pelvis through the rectum has been recommended, but I myself have never been

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able to palpate glands even if I found them enlarged afterward in the course of the operation.

Abdominal palpation might reveal carcinoma of abdominal organs outside the pelvis, thereby forbidding the operation. Palpation of the uterus through the abdomen may reveal a large tumor, but that in itself is not a serious obstacle.

Combined palpation, vaginal and abdominal, or vaginal, rectal and abdominal, will demonstrate the amount of mobility of the uterus and the condition of the ligaments. Free mobility of the uterus, which was of prime importance in the days of the old vaginal hysterectomy, is of much less importance for the method I advise, unless the immobility is due to carcinomatous involvement. If the immobility is due to carcinomatous fixation, the operation is not theoretically impossible, but it is practically useless as far as remote results are concerned. It is one of the important advances achieved by the performance of the radical abdominal operation that we know now that a uterus which appears immovable on combined palpation, may be perfectly operable, with good remote result, because in a number of cases the fixation is not due to carcinoma but to chronic inflammatory thickening of the ligaments.

CONDITIONS REVEALED AT OPERATION

In the course of the operation the operability may appear entirely different from that diagnosed before operation. Small metastatic tumors in the liver or carcinomatous adhesions to the intestines or omentum may be found immediately on opening the abdominal cavity, and classify the case at once as hopeless, when no amount of abdominal or combined palpation preceding the operation had revealed these conditions.

Therefore it is an important rule that every radical abdominal operation for carcinoma of the cervix should be begun as an exploratory operation. A rapid review of the liver, the abdominal glands along the aorta and

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its branches and of the bladder, must precede the actual operating in the pelvis. Conditions may be revealed here which forbid all further interference. Metastatic tumors of the liver make the case absolutely hopeless, as do also large carcinoma masses in the broad ligament, especially if they have perforated the ligaments and have made metastatic nodules on the peritoneum in the cul-de-sac or anywhere else. The condition of the glands is very difficult to interpret correctly. Large glands may or may not be cancerous and small glands are not necessarily free from cancer. Firm attachment of the glands to the veins must be considered very suspicious. This finding may occur in cases in which the carcinoma seemed confined to a small area in the uterus. These are the cases which appear perfectly operable on careful examination before the operation and prove incurable in the course of the operation. Toughness of the broad ligaments, if not combined with actual tumor formation, does not necessarily indicate carcinomatous involvement.

In the course of the operation conditions may be encountered which show the operation to be useless after it is more or less completed. For instance, it may be found, after removing evidently cancerous glands along the common and internal and external iliacs, that cancerous chains of glands extend under Poupart's ligament down into both thighs—a condition which I have seen. Or, in detaching the vagina, about the last step of the operation in the pelvis, it may be found that the pelvic connective tissue is invaded to an unexpected extent, a condition which I have seen. Then we have performed an apparently well-indicated operation and do not discover until its very end that it was all useless.

MICROSCOPIC STUDY OF THE TUMOR AND TISSUES

After the operation follows the extremely important microscopic investigation of the specimen. No amount of operative technic can further our knowledge so much as a carefully conducted pathologic investigation of the

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specimen with constant comparison of the findings before and during the operation, with those of the post-operative investigation. This post-operative examination uncovers all shortcomings of our diagnosis and of our operative technic, and must be the basis of future improvements. There is no greater satisfaction than to find that the results agree in all three stages, and no greater incentive for further work than to find out where and why they do not agree. Literally thousands of sections of glands and broad ligaments and cervix are required to make sure that we have operated outside the carcinoma, but this work, laborious and heart-breaking as it may be, is a most essential part of our task, on which the rational surgical treatment of carcinoma of the cervix must be based.

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THE USE OF THE CAUTERY IN THE TREATMENT OF CARCINOMA OF THE CERVIX

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Hysterectomy for carcinoma of the cervix has been a more or less unsatisfactory operation, the large percentage of early recurrences being an especially distressing feature of its results. The treatment of operable cases has now progressed to a well-nigh perfect degree in technic in competent hands. The radical abdominal operation, like the radical breast operation, when properly done, leaves nothing more that can be done in an operative way.

The one remaining thing to accomplish is to educate both the laity and physician to such a point that the patient will present herself early to her physician, and that the physician will make an early diagnosis, which being made, the patient will be forthwith sent for operation, rather than be kept under the physician's remunerative local treatments till the golden opportunity has passed. When such a condition has been obtained the statistics of radical pelvic extirpation will show different results than those of the past.

The experience of all operators is that a very large percentage of cervical carcinoma cases are much more advanced than the examination at first seems to show.

Bovée has said that fully 80 per cent. of all cases of carcinoma of the cervix are inoperable. The squamous-celled carcinoma of the portio vaginalis, as shown by Montgomery, is less malignant than the adenocarcinoma originating in the glands of the cervical mucous mem-

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brane. The latter much earlier involve the lymphatics than do the former.

Emil Ries, Wertheim, Clark, Sampson, Bovée and others have shown years ago that lymphatic involvement high up may exist when no suspicion or evidence of it existed on examination. Unfortunately, we shall always have a much larger percentage of inoperable cases with us than we would wish for. It seems to be a necessary step to decide definitely in our minds between what constitutes an operable and an inoperable case. The statistics of the past would have been better had there been a well defined line of demarcation between these two classes.

An operable case can be defined as one in which the disease is confined to uterine tissue alone, and an inoperable case, one in which the growth has involved surrounding tissues. It is often impossible to determine these questions until the patient is anesthetized. Examination through the rectum, high up, is necessary, as well as the vaginal examination. The rectal examination often tells more than the vaginal. If pain has been, to any extent, a symptom, it is probable that the extension is outside, for carcinoma of uterine tissue produces no pain nor tenderness.

Operations which do not remove all the diseased tissues only hasten the process of growth, as witnessed by the reported rapid recurrences in so large a percentage of cases. Many of these patients would live longer if they were never operated on. Another fruitful source of recurrence has probably been infection of raw surfaces at time of operation, as evidenced in the prompt recurrence in the scar in the vaginal vault. This scar would not be the first point of return were it not for this fact.

The late Dr. John Byrne of New York nearly twenty years ago demonstrated what he could do with the actual cautery in inoperable cases of carcinoma of the cervix. He reported a series of successful operations by the

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method of which he was the author, which to this day excels in results any that have been done by any other operator. He wrote of his method and reported his results from time to time till his death, but for some unknown reason his methods were never persistently followed by any of the army of operators who knew what he was doing. Dr. Byrne, in a discussion of one of Dr. Boldt's papers on carcinoma, made this statement relative to the apathy of the profession as to the cautery operation:

That the great bulk of our profession have practically ignored one of the least dangerous, but most successful of all the means yet devised for the relief and often permanent cure of uterine cancer is something *not* to be proud of in this age of progress.

His report made in 1896 as president of the American Gynecological Society embraced two series of cases, one consisting of 63 patients operated on for cancer of the portio vaginalis, of whom 23 patients had strayed away, leaving only 40 to account for. Of these, "exemptions from relapse were obtained ranging from two to twenty-two years, averaging nine years for each."

The second series of 81 cases, out of which 31 patients had strayed, he reported exemption from relapse as follows: 10 for over two years; 11 for over three years; 6 over four years; 8 over five years; 6 over seven; 2 over eleven; 1 over thirteen and 1 over seventeen years. He further reported one of his stray cases, a very unpromising one when operated in 1875, discovered alive and well 21 years afterward.

Undoubtedly a goodly proportion of the patients subjected to hysterectomy in the past would have been as well, and probably better off without operation, and would have lived longer. It is manifestly our duty not to operate when the results of such operations are known not to relieve, but probably hasten the death of the patient. But we cannot desert these poor sufferers. And in the cautery operation of Dr. Byrne we have the means of doing for them that which cannot be done in any

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other way. All the other make-shifts, the chemical caustics, such as zinc chlorid, pyoktanin, bromin, etc., are useless as compared to the galvano-cautery, because they are difficult to control and of doubtful efficacy.

The galvano-cautery can be controlled, and all done while the patient is under the anesthetic. When the cautery is withdrawn we are sure that no further destruction of tissues is going on. With the chemical caustics such is not the case. Besides, the cautery is more penetrating and certain in its results.

The acetone treatment, which Dr. Gellhorn of St. Louis first called to our attention by his publication in THE JOURNAL of this Association in 1907, and later in the *American Journal of Obstetrics and Gynecology,* I have never tried. I have been trying out the cautery in this class of cases. Acetone is not to be classed with bromin, zinc chlorid, etc., because it is not a caustic and is followed by no sloughing. It is more of a hardening fluid; but from all reports I doubt that its depth of penetration is equal to that of the cautery. One of the strongest points in favor of the cautery is that scar tissue follows its use, and as scar tissue always is contracting, it to a greater or less extent interferes with the nutrition of the cancer growth and thereby prevents recurrence or inhibits rapid recurrence and growth.

When the carcinomatous growth has progressed to the stage of breaking down with hemorrhage and infection, we have not only the results of the hemorrhage on the general health of the patient, but we also have various grades of toxemia from the infective processes accompanying the sloughing and bleeding cancer tissue. Both the hemorrhages and the infection may be stopped by the thorough use of the cautery, thereby controlling two of the prominent inroads on the health and life of the patient. And if in addition thereto we take into consideration the cessation of foul, fetid discharges, which are disgusting to the patient and all about her, we have added no inconsiderable blessing to her existence. By

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this means if we do not permanently cure the patient, we are adding to her length of days as well as making her life more happy and tolerable.

Manifestly cauterization of a fungating cervix will not cure the patient if the infection has passed up into the pelvic lymphatics beyond the reach of the cautery. But in a small portion of cases even far advanced, infection of the lymphatics higher up has not occurred, or else Dr. Byrne could not have had patients alive five to twenty years after cauterization with no evidence of any carcinoma present. Undoubtedly many of his successes were in cases which were seen comparatively early in the disease, and as he treated all patients with cancer of the cervix with the cautery, instead of hysterectomy, his results would naturally give a larger percentage of cures than are obtained by treating the inoperable cases only, by this method. Cases which we consider safely operable are seldom if ever treated in this way, but the radical operation is done probably with as great or better chances of non-recurrence, with a proper technic, to prevent reinfection at time of operation.

The sharp curette is the adjuvant of the cautery in the inoperable class. By it all the soft bleeding mass may be removed, thus excavating down to the basement carcinoma. All of the cylindrical water-cooled speculums which have been devised, to my way of thinking, are hindrances rather than helps to the efficient performance of this operation. Because by their thickness they so limit the field of operation and vision that I, at least, cannot do it thoroughly. Burning of the vagina or bladder may be prevented by placing over the blades of speculums and retractors moist gauze jackets made to fit them. By this means a wide field of vision and action is obtained. After curetting away all the soft tissues, there is more or less oozing and sometimes bleeding. Dr. Boldt, several years ago, suggested, and I think practiced, packing the crater thus made and waiting

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a day or two before using the cautery. If there is too free bleeding which cannot be readily controlled, this is a good plan to follow, for the effective use of the cautery demands a comparatively dry surface; otherwise the penetration of heat from the cautery tip will not be sufficient. Dr. Byrne used a saturated solution of zinc acetate with 25 per cent. of strong acetic acid to stop oozing and to dry the curetted surfaces before using the cautery. The acetone, from Dr. Gellhorn's report, will also prove to be the ideal application to stop all oozing.

I think that many operators have failed to get results and have given up the attempt to do this operation because they have not used a good and efficient cautery. No Paquelin thermo-cautery apparatus that I have ever seen can do the work properly. Only the right kind of electro-thermo cautery will do this work efficiently. Ordinary cautery batteries are of doubtful utility. The ordinary street current used for incandescent electric lighting, controlled by a rheostat, gives the necessary power to heat a platinum dome to any degree desired from dull red to white heat. Before using the dome the operator should determine where he desires the most penetration, where the tissues are thickest and what he wishes to avoid, be it bladder or peritoneal cavity. The peritoneum has been opened by the cautery with no ill results. So long as intestines are not burned, no peritoneal opening could be made under more aseptic precaution. The bladder, rectum and ureters only are to be avoided. The uterine arteries if not exposed may be destroyed by the deep cooking process with impunity, for they will, long before the slough comes away, have been effectually sealed. Dr. Byrne suggested that no packing be used in the crater subsequent to the cautery, as in its removal the slough might be forcibly torn away and hemorrhage follow. Natural separation I have never known to produce any bleeding.

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The best results may be secured by not placing the heated dome against the tissues, but by holding it near them, thus allowing the heat to make the greatest penetration, roasting them as it were. If the bladder is well held up by a wet gauze-protected retractor it will never be damaged; neither will the penetration of the heat reach the ureters unless it is much overdone.

It is only within the past five or six years that I have been doing this work in a manner which has appealed to me as effectual in this class of cases. Some of the patients have lived two or three years very comfortably; two have been, I believe, absolutely cured, now living, one four and the other five years. One had passed the menopause, and she has a shriveled cicatrix where her uterus was, and is well. The other was not yet past the menopause and had hematometra after the cautery, by occlusion of the uterine canal, for which I did a vaginal hysterectomy. This uterus was investigated thoroughly after removal and not one slide showed any vestige of cancer tissue in it. She is well five years after the last operation. In general, all of these cases have been made more comfortable than were those whom I formerly operated on and have lived longer.

I have done several hysterectomies for those whom I cauterized three or four times previously to the operation. The effect of the cicatricial deposits after the use of the cautery has been to inhibit the growth of the cancer to an extent which warranted me in making the attempt to do a radical abdominal operation later.

I wish, therefore, to suggest the idea of using the cautery as a means of preparing a limited number of these cases for later radical operation. I have further to suggest the use of the cautery freely before doing a radical operation, with the idea in mind that no inconsiderable part of the subsequent recurrences in the scar, as before outlined, are due to fresh infection of the raw surfaces at time of operation.

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I believe that free and deep cautery of the cervix before radical operation does more to prevent such recurrences, as no other means has been devised that will not at times fail. This I believe to be a very much more important step in the technic of the radical operation than would at first thought appear.

64 Richmond Avenue.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. SAMPSON, JACOBSON, RIES, AND FREDERICK, CONSTITUTING A SYMPOSIUM ON CARCINOMA OF THE UTERUS

DR. GEORGE GELLHORN, St. Louis: The papers have presented so many phases of the subject that I shall confine my remarks to the paper presented by Dr. Frederick. Dr. Frederick has spoken of the cautery for two different purposes, if I understood him correctly; one for the purpose of radically curing a cancer, and the other for the purpose of treating inoperable cases of uterine cancer. I wish to refer only to the second use of the cautery. I can confirm the statement of Dr. Frederick that the thermocautery will relieve the symptoms for a short time but I must insist that any lasting good effect can be accomplished only by a methodical repetition of its use. Only if it be applied every four weeks for six or seven months in succession is a good result likely to occur. Unfortunately the patients do not return for such repetition; at least, my experience has been that a patient would come a second time, but I have yet to see the patient who would come back to the hospital for a third cauterization, so that the good effect of the cautery remains more or less theoretical. The majority of inoperable cases after all are in the hands of the general practitioner and the cautery is hardly an appliance of general practice. The odor of the profuse discharge and the hemorrhage are so overwhelming that the practitioner is practically helpless. The acetone method is especially suited to his needs. Regarding the criticism made by Dr. Frederick, I would state that the penetrating effect of acetone seems to be very great. From our laboratory knowledge we know that it deeply penetrates dead tissues, and it is only logical to suppose that the penetration in living tissue is even more quick. Two and a half months ago I curetted an inoperable cancer and after the excochleation the opening was large enough to admit a speculum about two inches in diameter. On Monday last I only succeeded in introducing a very small vaginal nozzle into the crater in order to pour the acetone in. This would show that the penetration is sufficiently deep and the resulting formation of scar tissue satisfactory. Of course,

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these patients all die, but we are able to keep them alive from one to two years and in comparative comfort. One of our patients in the St. Louis Skin and Cancer Hospital who had been declared inoperable by Wertheim when he was in St. Louis occupied her position as scrub-woman in a downtown office a year after having been declared inoperable, earning a livelihood for herself and family. The woman died almost two years after the first treatment and might have lived longer except that the absence of symptoms induced her to stay away from our treatment. The acetone treatment is a very simple method and can be used in the hands of the general practitioner who has not hospital facilities. The lesion should always first be curetted very thoroughly. I use a large spoon devised by Dr. Boldt. After curetting, I insert a Ferguson speculum into the bleeding wound and then pour the acetone into it. In all the cases that we have observed the bleeding has been checked. We use the pure acetone, a chemical that is used for the wholesale preparation of chloroform, and also in machine-shops for dissolving fats. It is poured into the speculum and left there for fifteen or thirty minutes. It is then permitted to run out, a piece of gauze soaked in the acetone is inserted into the wound and the speculum is removed. The patient is returned to bed, which she may leave the next day. Regular treatment is begun five days after this preliminary treatment and applied three times a week for several weeks. As the symptoms improve we gradually lengthen the intervals. I have again and again tried to curette these lesions after five or six or seven weeks of treatment and I have hardly ever succeeded as the walls are hard and smooth in contradistinction to the spongy character of the original excrescences. The subsidence of the symptoms of the patient, aside from the relief of hemorrhage, odor and discharge, is very marked. Perhaps owing to its chemical relationship to chloroform the acetone seems to have an anesthetic effect on the patient. In many cases the pain disappears. When the cancer has reached the nerves, of course, the acetone does not relieve pain. In those cases we have to resort to morphin. Certainly, however, the subjective symptoms of cancer have been greatly relieved by this method, and we have, after trying various other methods, always returned to this and shall continue to use it until we find something better. At that time, however, we shall be the very first ones to adopt the better method.

Dr. Reuben Peterson, Ann Arbor, Mich.: I have been much interested in the Ries operation for the radical cure of cancer of the uterus ever since Dr. Ries brought forward his operation in 1895. I had the good fortune to be associated with him shortly after that time in the Chicago Post-graduate Hospital. I can only praise the thorough work which Dr. Ries has done with his operation and the consistency with

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which he has followed along one line. But I differ with Dr. Ries because of my own experience. We are not partial to any one operation unless it will save the most patients. My experience with the radical operation for cancer of the uterus as I tried to carry it out according to Dr. Ries' directions. gave me such a high mortality that I concluded that if I could do a less radical operation and save more lives, the women at least would be better off. I agree with Dr. Ries that statistics based on less than 100 cases do not count for much. Yet, right after that he gives his own statistics with much less than that number. We must talk about our results for that is what we have to go on. My mortality for the first fourteen cases was 42 per cent. That is a shocking mortality to anybody who is doing abdominal work. Out of the seven patients that have been operated on for five years there are four alive. Two of these had carcinoma of the fundus, which Dr. Ries very properly says are in another category. Still. theirs are cancer cases and in my hands prior to this abdominal operation I did not save such patients. You say it is easy to save them, but I didn't. I remember only one patient whom I operated on for carcinoma of the body that I saved by the old method. So setting aside, if you please, the two cases of carcinoma of the fundus I have two patients out of seven to my credit who have lived beyond five years. Since that time I have been doing less radical work, not making such extensive dissection of the glandular tissue as Dr. Ries recommends. My primary mortality is much better, as of course, he will say it should be. The operation, even when one does not dissect out the glands, is a terrible one and I agree with him it is the worst we have to perform. In my last twenty-three cases I lost but one patient. Some have lived for over three years. I do not know whether they are going to live beyond five years, but I know that the mortality is much more satisfactory, and taking that as a whole I think I shall be better off as far as saving these women is concerned than if I did the radical procedure.

Statistics improve with the operator's experience. I can now see my mistakes with my first cases. I have had the same experience that Dr. Ries and others have spoken of, that when you begin with this operation you have an idea that when the uterus seems to be firmly fixed in the pelvis the patient is beyond hope. I quite agree with the essayist when he says that every operation should be an exploratory laparotomy. In some of the cases it is a matter of surprise to find that the induration to one or the other side of the cervix is really inflammatory tissue and not carcinomatous.

There is a certain class of patients whom I exclude from this radical operation irrespective of the extent of their disease because the primary mortality is so great. Such patients are the excessively fat women. They die from the operation almost

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invariably and I think that I shall do better by them in carrying out the palliative treatment because in my hands, at least, they do not stand the ghost of a chance of surviving with the radical operation.

DR. A. GOLDSPOHN, Chicago: I also admire the radical work which Dr. Ries has done; but when we consider the results of very extensive autopsies in uterine cancer cases, particularly those made by Schauta, which show that in only about one-fourth of all the cancer cases the glandular involvement is located only in or near the pelvis, so that thorough operation and search for the glands is rational, we feel that extreme searching for glands is irrational and disappointing. We all know the extensive research work which Schauta has done in some eleven or twelve thousand post-mortem examinations of glands. The conclusion of the matter is that if these ideas of thorough extirpation are to be actually followed, then the operation, which consists in eliminating the human trunk, as Dr. Ries has mentioned, would be necessary.

In the majority of cases the metastatic glands are located in both the upper and the lower parts of the abdominal cavity. In a small proportion they are in the upper part only. In all of these the extreme search for glands means the cutting short of many lives by unwise operating, for no good reason. Since recurrence most commonly takes place in the cicatrix of the amputated vagina a very liberal exsection here is called for. A procedure which I like consists in doing an abdominal hysterectomy with a moderate search for glands. Take out the uterus thoroughly with the adnexa and broad ligaments as closely up to the bony limits as possible. Get the entire uterus free from everything except the vagina. Dissect the upper part of the vagina also from the connective tissue area. Then tuck the whole uterus with the inverted vagina down into the small pelvis. Close over the small pelvis by peritoneum from different directions at about the level between the true and false pelvis and close the abdomen. Then go to the vagina and take out the uterus, taking with it the upper portion of the vagina more thoroughly and safely against bleeding than can be done from above. This method has given me rather satisfactory results. Repeated cauterization is also followed by good results, in the inoperable cases. I have seen a number of such patients live quite comfortably for three and four years.

The excellent views of Dr. Sampson have shown what needs to be emphasized—that in the majority of cases cancer of the uterus begins in the upper part of the cervix. Germans have shown that it comes chiefly from retention cysts, *i. e.*, the Nabothian follicles superficially and deeply seated up in the cervical canal. These vulnerable and dangerous glands can mostly be removed in amputations of the cervix, when any operation for lacerated or pathologic cervix is indicated.

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Such amputation, then, and not the Emmet trachelorrhapy should be done. As a prophylactic for cancer it will do much more good than the heroic search for glands with the attendant mortality in attempts at cure.

DR. ELIZA M. MOSHER, Brooklyn, N. Y.: The small number of patients with cancer of the uterus who are cured emphasizes what has been said here and for years past on the importance of instructing women in reference to the symptoms and early signs of this disease. Even though we realize the tremendous importance of it, we cannot do very much in our offices in the way of prevention. You will be glad to hear that the committee appointed last year by the House of Delegates, termed the "Public Health Education Committee" has been able during this year, in New York and Brooklyn alone, to give careful instruction on this subject to more than a thousand women, through these lectures. Throughout the United States the same teaching is being carried on, and we are hoping that the number of cases of late cancer will be lessened materially during the next five years through the work of this committee.

DR. HORACE G. WETHERILL, Denver: In regard to the work to which Dr. Mosher has just referred, as your representative in the House of Delegates, I may say that this committee made its report to the House of Delegates yesterday and it was a very comprehensive, dignified and tactful report, showing excellent work on the part of the committee. So far as may be in our power this Section should endorse and support this educational committee.

DR. J. H. JACOBSON, Toledo: Just a word in reference to the statistics that I have shown. I realize full well that everything which Dr. Ries has said is true; that it is very difficult to get statistics in which a genuine radical abdominal operation has been performed, and that it is impossible to get statistics of operations performed as thoroughly as Dr. Ries does them. I was prompted to make this statistical study because the operations ordinarily performed for the cure of cancer uteri, have appeared to me only palliative at best. If we expect to make any advance in this work we must make our operations more radical. I admire Dr. Ries' work very much and have only words of praise for it. Wertheim's results are the best up to the present time. I hope that this statistical study will help operators to adopt this operation which has a higher percentage of permanent and absolute cures than any other.

DR. EMIL RIES, Chicago: Wertheim removes a few glands from a patient and gives a low percentage of carcinoma in the glands. That does not prove anything. If anybody removes glands extensively, as some have done, the number of cases in which carcinoma is found in the glands is about 60 per

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cent. That means that two out of three women have cancer in their glands when they have carcinoma of the cervix. You take the chances on the 60 per cent. if your main purpose is a large primary recovery. You can do so. You are the physicians and it is for you to say, only be honest with the patient. Tell her what you can do. Wertheim said in Chicago that all the patients in whom he found cacinoma in the glands had recurrence. Why? Because he did not take out enough.

The so-called recurrence in the scar in the vagina is not new disease. It is only the consequence of insufficient operation. The operation did not go far enough.

Just a word in regard to Schauta's report. Dr. Goldspohn did not tell you all about it. He did not tell that Shauta's work has been refuted by Mackenrodt. Shauta's paper shows that he examined from six to ten glands in each case, when the smallest number should be approximately twenty. As he overlooks the other fourteen the work of Schauta is absolutely useless. If you have no conception of the meaning of examining glands for carcinoma, try it in one case. I have examined 1,200 sections from one case without finding a single bit of carcinoma, while the next 200 sections were full of it. Anybody not willing to do such work should not talk about it.

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THE PLACE OF HEBOSTEOTOMY AS AN AID TO DELIVERY

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Since pregnancy in woman usually consists in single fetation and since the child is born needing the care of the mother for years to come, that obstetric treatment which does not strive to the utmost to result in a living healthy mother and child ignores the fundamental purpose of pregnancy, namely, reproduction.

The obstetric art cannot afford to be wasteful of a single life. As long as there is a child mortality of 2 per cent., as reported by Hill, as well as a maternal mortality and morbidity and due directly or indirectly to disproportion between the size of the passage and the passenger, we are entirely justified in our efforts to secure for each mother and child that treatment best adapted to their needs.

APPLICATION AND LIMITATION OF HEBOSTEOTOMY

Hebosteotomy must be considered in the light of its success in certain conditions in which other measures fail and its limitations must be set only by the greater success of other procedures to terminate the pregnancy safely for mother and child, to which end the state and the individual has a right to expect that every means possible be brought to bear. Two important erroneous impressions obtain in this relation: first, that preg-

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nancy and labor are physiologic processes and second, that when they cease to be so, the separation of the mother and child at all hazards to the child constitute successful obstetrics. When we consider the number of maternal and fetal deaths, the invalidism in mothers from tears, infections, hemorrhages, etc., and the crippled and mentally defective children that result, it will be seen that it were greater wisdom to consider them pathologic processes. This would send the obstetrician to his case better equipped mentally as well as materially. This would also do away with the midwife, one of the greatest inconsistences of modern medicine. As to the second point, it may not always be possible to save mother and child but failure to do so allows the pregnancy to fail of its purpose and this should not be until every measure at our command is exhausted. Good obstetrics means not only watchful expectancy for a spontaneous delivery but wise intervention looking toward the saving of the life and health of mother and child.

Not every practitioner has acquired such skill in pelvic measurements that he can determine the amount of contraction, flattening, narrowing of the pelvic arch, exostoses, size of the child's head, etc., to a nicety; neither can an expert estimate the proportions to a certainty, but such skill can be acquired as will foretell a probable difficult labor and too much emphasis cannot be laid on the importance of seeking hospital care and the services of one skilled in obstetric technic in order that the right step may be taken at the right time.

METHODS OF DELIVERY

The purpose of this paper is to review some of the methods in use in the presence of disproportion between the child's head and the pelvis of the mother and to deal in particular with one of these methods—hebosteotomy.

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1. A marked degree of contraction has been considered a justifiable excuse for abortion in the early months of pregnancy, but if we do not presume to judge between human lives 100 per cent. fetal mortality is too high a price to pay.
2. Artificial labor is sometimes induced after the period of viability has been reached in moderate degrees of contraction.
3. Efforts have been made, and with reported success, to control the growth of the child during the latter months of pregnancy.
4. Labor is allowed to continue beyond the usual length of time in order that a disproportionally large head may mold.
5. The high forceps are applied and efforts made to drag the head into and through the pelvis.
6. Version is performed to force delivery of the mother at the expense of the child.
7. Craniotomy is performed even in the living child by some.
8. Cesarean section is chosen when a medium or marked degree of contraction is known to exist or when it is discovered while the child is still living, head not engaged, and the mother still in fair condition and uninfected. In some instances these objections might be set aside in favor of Cesarean section.
9. Enlargement of the pelvis to meet the disproportion is accomplished by separating the symphysis, or preferably cutting through the body of the pubic bone, the first known as symphyseotomy and the latter variously known as pubiotomy, hebotomy, etc., but preferably called hebosteotomy.

I would not wish to say that any one of these methods is without its field of usefulness in some hands, but I should have to have a stronger indication for abortion and craniotomy than that a patient did not wish to submit to a fairly safe obstetric operation. The periods of pregnancy and labor are no times for a woman to prove a "quitter." I should say that she has no right to ask the life of the child that she may avoid hebosteotomy or a comparatively safe Cesarean section. Artificial premature labor is followed by a large fetal

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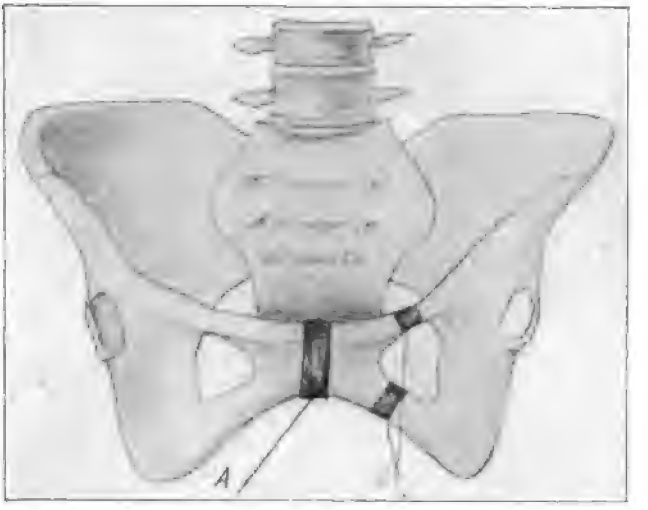

Fig. 1.—Diagram of (A) Sigault's symphyseotomy (1777) and (B) Pinard's ischiopubiotomy (1892).

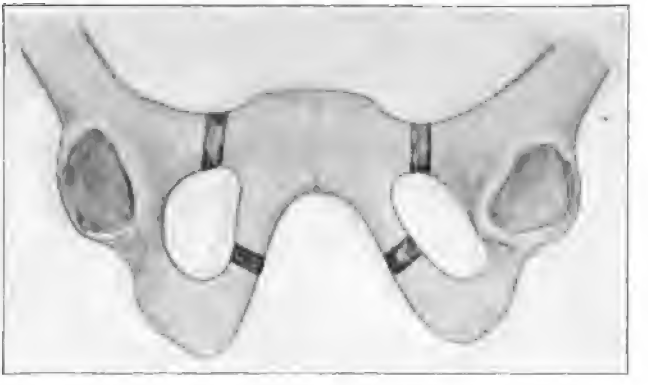

Fig. 2.—Aitken's pelvitomy (1785).

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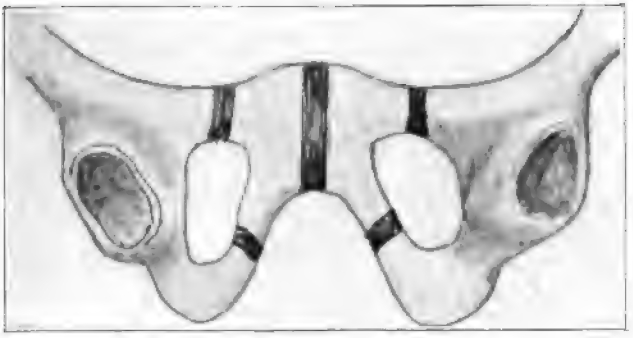

Fig. 3.—Galbiati's "pelviotomia," 1819-1832.

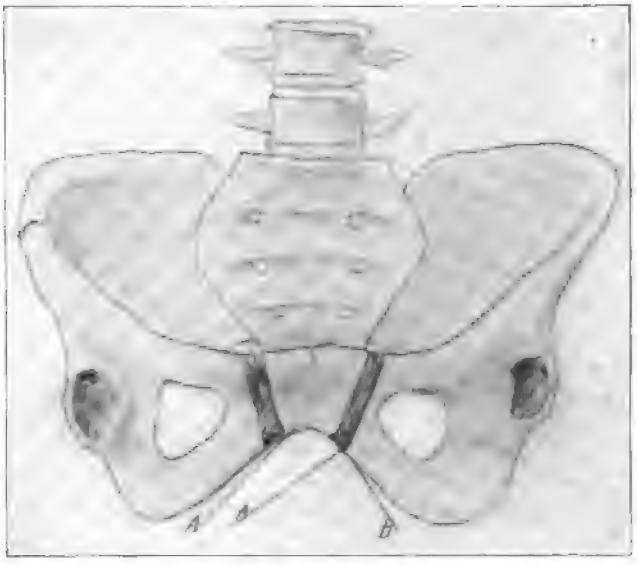

Fig. 4.—Diagram of (A, A') Pitois' bipubiotomy (1831), and (B) Champion's pubiotomy (1844).

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mortality and efforts at dwarfing the growth of the child may prove ineffective or harmful if effective.

Again our treatment in many cases begins only after labor has begun or long continued. The value of a long and forced labor in molding the head in cases of mild disproportion must be appreciated and yet the dangers of exhaustion of the mother and compression of the child's head must not be underestimated. The head floating above the pelvic brim after long-continued labor indicates a marked degree of disproportion in which version and high forceps are seldom, if ever, indicated, as they are murderous to the child. Cesarean section, with the improved surgical technic, holds a wide and increasing field of usefulness. That there have been errors none will deny. Much has been said about Cesarean section displacing hebosteotomy; they are not entirely competitive procedures, they are complementary, each having a place of its own, yet with their fields overlapping.

Remove hebosteotomy, and craniotomy or its near cousins, high forceps and version, have to be substituted. Hebosteotomy is for the living child; craniotomy for the dead. A well-chosen Cesarean section promises life for the future child after the death of this one: hebosteotomy steps in to save this one. "Cesarean section gives a high percentage of recoveries." True, in selected cases; but done in those cases in which hebosteotomy could be successfully done the mortality would decidedly increase. Cesarean section permits of no well-determined efforts at labor in the border line cases with a safe means of escape if that effort fails. The statistics of Cesarean section and operations on the bony outlet cannot rightfully be compared, as the former are done on fresh patients while the latter are frequently done on exhausted patients.

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THE PLACE OF HEBOSTEOTOMY

I make no enthusiastic claim for the theoretic beauty of the operations of enlarging the bony pelvis, but if it saves life and in no great degree sacrifices health, it has a place, and if it has a place its successes will be greater as its indications are better understood and its technic improved. There is at present wide variations of opinion. The value and the place of the operation is not determined. Williams, who formerly spoke very discouragingly of symphyseotomy and in favor of Cesarean section, now reports his experiences based on 25 cases of hebosteotomy with marked success and this is entirely worthy of the consideration of the champions of Cesarean section who think that this should take the place of hebosteotomy.

RESULTS IN SIX CASES

My experience is based on six cases, the results of which have gone far to overcome my former prejudice against the advisability of attacking the bony pelvis. The six patients while operated on during varying degrees of exhaustion have resulted in six living mothers and six living children. Of these six cases four were seen after labor had continued for many hours. The patient in Case 4 had been in labor four and one-half days. The patient in Case 3 began labor under my care but was required to exert a strong test of labor because she had previously been delivered of a 9½ pound girl, with high forceps. She was urged to enter the hospital at the second delivery as it was found that the head was large and a moderate exostosis existed at the symphysis. The patient in Case 6 entered the hospital under my care and it was thought that delivery would take place. The test of labor and the use of forceps with moderate force disproved this. The patients in Cases 1, 2, 3, 5 and 6 had had forceps used previous to the operation of hebosteotomy. In Cases 2 and 3 and 6 the forceps were applied by myself and a

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very careful effort made to engage the head. In Case 5 the forceps had been applied several times before the patient entered the hospital, the head was arrested in transverse position. It was thought that delivery might be effected with the use of the forceps, but the child's heart-beats were so rapid and weak that it was not thought best to put the additional tax on it. Extreme efforts at resuscitation had to be used even after a very easy delivery by hebosteotomy. In this case the soft parts over each parietal eminence sloughed but with no evil after-results.

This, like many of the complications, must not be charged to the operation. In Case 4 the head could not be reached with any degree of safety for the application of the forceps. In three cases the hebosteotomy com municated, through more or less considerable tears, with the vagina. These were closed with drainage and in no way seem to complicate the healing of the bone. In no case were the tears more extensive than frequently happens without the operation, and Case 6, in which the patient had extensive vaginal tear due to necessarily wide separation, resulted not less favorably than those with less tear. In no case was there even annoying hemorrhage at time of operation or hematoma afterward.

In Case 1 the operation was done in conjunction with Dr. Fitzpatrick by the open method. The Gigli saw was placed so far inward as to saw partly bone and partly cartillage. All others were done by the subcutaneous method and separated entirely through bone. The postpartum operation in Case 1 of bringing the bones and soft parts together consumed considerable time, while by the subcutaneous method all this was avoided.

The bony separation obtained we have estimated at from 3 to 6 cm. (about 1¼ to 2½ in.). Four of the patients have been recently inspected and in no case is there a waddling gait or difficulty in walikng due to the bony pelvis. The patient in Case 3 has some pro-

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lapse of the soft parts due to injury to the levator ani muscle; and the one in Case 4 has the cervix fixed by scar tissue but it is on the opposite side from that operated on and evidently in no way due to the operation.

COMPLICATIONS

Operators have recorded many evils and complications among which are injuries to the urethra, injuries to the head of the child (laceration of the ear), traumatism of the iliac vessels, separation of the sacroiliac joint, severe hemorrhages (in some cases causing death), failure to obtain room for delivery even after this operation, non-union leading to disability, etc. These misfortunes have not befallen my patients thus far. It will also be seen that many of these are evils which may occur in case of severe labor without this or any other operation and many of them are plainly due to the injuries which have preceded the hebosteotomy or took place during delivery independent of the cutting of the bone. Direct injury to the bladder or to the head of the child have been due mostly to a sharp needle and this in itself must be looked on as faulty technic.

In addition to the usefulness of hebosteotomy in immediate delivery it is interesting to determine the kind of healing that takes place as having some bearing on the future health of the mother and on future childbirth. In all cases examined the union has been firm, allowing no play of bone ends. In no case has there been a callous felt on the underside of the bone, but thickening has been felt on the upper surface persisting for some time. In four cases examined recently no thickening remains to suggest a previous operation. In one case a slight depression could be felt on the under side. There was, in all but one case, some fixation of the vaginal wall at the site of the operation. The skiagraphic picture has indicated a fibrous union in two cases but with separation of only ¼ and ⅜ inches,

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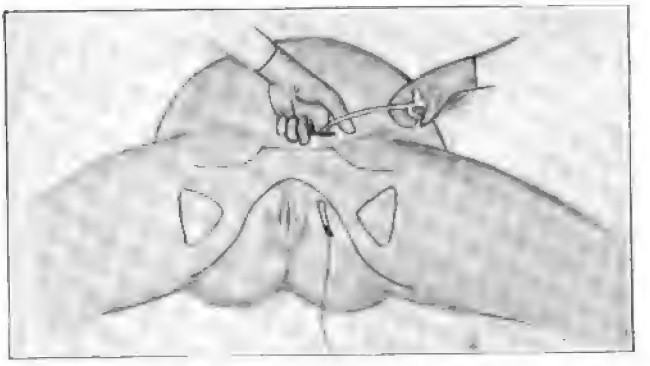

Fig. 5.—Döderlein's hebosteotomy, showing short transverse incision above the pubic bone for the introduction of the finger to guide the needle inserted from above downward.

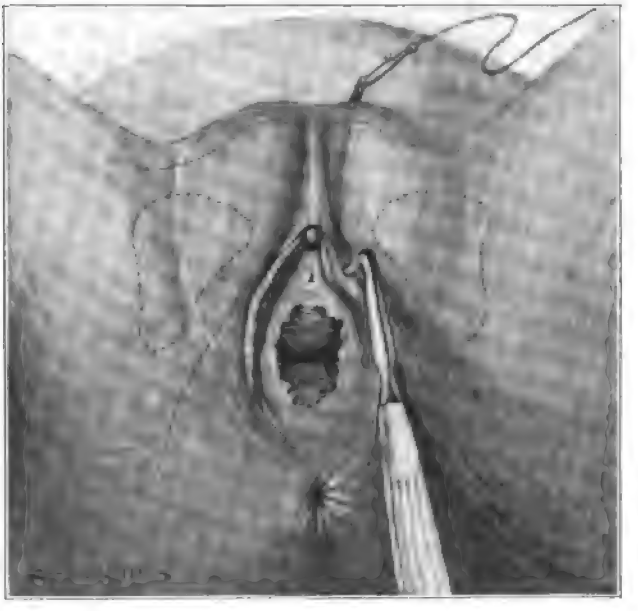

Fig. 6.—Hebosteotomy, showing the author's needle in place, entering just under the body of the pubic bone and emerging just above the bone and inside the pubic spine. The silk carrying the saw is then double threaded or tied in the eye of the needle.

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respectively. The skiagraphic results in the other cases were not satisfactory and future attempts will be made.

The above finding speaks well for the recovery of the patient but would seem to promise little so far as permanent enlargement is concerned. Williams reports the case of a patient dying after Cesarean section in a pregnancy following a hebosteotomy, in which a post-mortem study indicated a softening of the fibrous union that promised considerable enlargement. Some of his cases have shown enlargement and movability without apparent disability in locomotion. He reports, however, that such enlargement cannot always be expected as one patient had a second hebosteotomy with a child weighing even less. Seven of the pregnancies following the operation in his cases terminated as follows: 1 hebosteotomy, 2 Cesarean sections, 4 spontaneous deliveries.

It must not be taken for granted, however, that the cases of spontaneous delivery were necessarily the result of permanent enlargement, for some of our patients had been previously delivered successfully. Neither must it be taken for granted that a patient having had a hebosteotomy is going to require operative delivery and a Cesarean section chosen, on that ground alone. Credé, Truzzi and Wendeler, Schikeles, Hammerschlag, Bell and others have advocated methods looking toward permanent enlargement, some even requiring extensive dissections.

When we consider that it is only in the slightly or moderately contracted pelves that hebosteotomy is applicable and in these cases the test of labor is needed to determine whether or not any enlargement will be required, and when it is so easy to get the desired enlargement at the time, if it is found necessary; and when we further consider that any permanent enlargement that would not cause a disability must necessarily be limited, while the required enlargement may vary 3 to 6 cm., such procedures must be

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viewed in the light of meddlesome surgery. I am convinced that our best results will be obtained by endeavoring to get the required enlargement for the present delivery with the best approximation and healing possible, leaving future deliveries to be determined by the merits of the case, spontaneous delivery if possible, forceps if required, hebosteotomy if necessary, Cesarean section if the degree of contraction is so great that delivery was very difficult with the previous hebosteotomy. To the extent that we get permanent enlargement, in that proportion shall we have disability in locomotion or pelvic hernias.

INDICATIONS

Lewis, in a summary of the literature, says: "I think the indications for both symphysiotomy and pubiotomy will become narrower and narrower as time goes on. In individual cases the decision will be between Cesarean section and perforation rather than between symphysiotomy and pubiotomy."

DeLee condemns hebosteotomy, but both these authorities speak without personal experiences with the operation, preferring Cesarean section. In many cases the opportune time for Cesarean section is past long before the life of the child is extinct—these authors would have to resort to craniotomy or, in these cases, a death-dealing high forceps or version. I think it may be said that the operation is indicated whenever it promises greater assurances of life to the mother and child than any other measure obtainable under given conditions. It can not compete with Cesarean section in marked degrees of contraction seen early. It has no reason to compete with craniotomy in the dead child. Neither can Cesarean section compete with hebosteotomy in patients who are seen advanced in labor and in whom numerous examinations and forceps applications have been made, making infection possible, or when the mother is exhausted. Yet in many of these cases crani-

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otomy has no place, and version and high forceps are scarcely better.

It must be said that under these conditions hebosteotomy is not at its best but is not precluded, and may be said to have a wide field. Its most ideal field is in those cases in which a moderate degree of contraction foretells a difficult labor but in which there is promise enough of delivery that a good strong test of labor is desired. Here the patient should be placed under the best of surroundings and progress awaited. Should the mother or child show exhaustion, speedy delivery may be obtained at any time. I have not chosen the prophylactic hebosteotomy, for experience has shown that had I been so inclined I would have performed the operation on patients who were delivered spontaneously, or with forceps. On the other hand I recall a number of cases in former experience in which I should now employ hebosteotomy. Some place the aseptic restrictions on hebosteotomy almost or quite as strong as on Cesarean section. While it is true that sepsis complicates any operative procedures and that complications will increase thereby, yet the mere possibility of sepsis is no contraindication to the operation, and it must be remembered that the infected woman is not safe with or without operation, and instances may arise in which the saving of the child will more than offset any slightly increased risk to the mother incident to such operative procedure.

HISTORY

Hippocrates recognized the disproportion between the child's head and the pelvic outlet and its tendency to cause malposition. His writings also express the belief that delivery is effected by a separation of the pubic bones and that this should be permanent, making future childbirth easy. Only the dangers of surgery would prevent this conception from being utilized in enlargement of the pelvis during difficult labors. Hebosteotomy

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can only be said to secure the advantages of symphyseotomy minus some of its disadvantages, and therefore the history of the two is closely associated.

Sigault first demonstrated the possibility of pelvic enlargement by means of separation of the symphysis in 1768 but he lacked opportunity to demonstrate it on the living until 1777 when he and LeRoy operated on Mme. Suchot, who had had four difficult confinements with no living child. This resulted in a living child. Antonio Delgado in 1781 published an account of an operation of separating the symphysis with a knife subcutaneously; great enthusiasm was shown for symphyseotomy but it met in Baudelocque a caustic opponent. Misjudgment and lack of skill led to its falling into disrepute for nearly a century, when it was revived in 1866

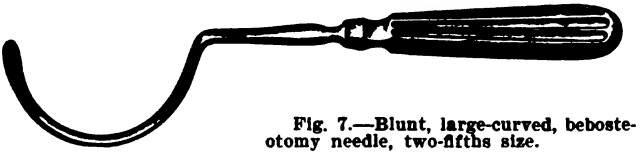

Fig. 7.—Blunt, large-curved, beboste-otomy needle, two-fifths size.

by Morisani, who in 1881 reported 50 operations with 40 recoveries. Spinelli and Pinard are credited with its introduction into France.

R. H. Harris called attention to its use in this country, but Jewett was the first to perform the operation on this side of the Atlantic. Numerous methods of enlarging the pelvis were proposed in the century following Sigault's work. Pitois in 1831 proposed "bipubiotomy," severing both pubic bones. Champion proposed restricting this to one side in 1844. Aitkin in 1785, proposed "pelvitomy," cutting into the obturator foramen on each side severing all rami of the pubic bone. Galbiati's "pelviotomia" in 1819 to 1830 extended this to include the separation of the symphysis, but evidences are lacking that these operations were performed

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except on animals. Gigli in 1894, after a study of the disadvantages of symphysiotomy, proposed the cutting of the pelvic bone through an incision; this was but carrying out the idea of Champion fifty years previously. Bonardo of Lugano was the first to perform the operation in 1897. Calderini, Van de Velde and Gigli soon followed. Doederlein in 1904 substituted a small incision through which the tip of the finger could be inserted, to guide the needle posterior to the pubic bone. Walcher and Bumm punctured the skin and carried the needle through without the introduction of the finger. Montgomery of Quincy, Ill., was the first to do pubiotomy in this country, and recommends the Gigli incision, claiming to see no advantage in the subcutaneous operation. My observation would lead me to a far different conclusion.

CHOICE OF METHOD AND TECHNIC

As a means of enlarging the pelvis, hebosteotomy must be compared with symphysiotomy, the older operation. Each procedure has its supporters but there is a growing consensus of opinion that hebosteotomy secures all the advantages of the other operation minus some of its objections. Comparisons of statistics are drawn from a period when operative technic was less perfect, and again the statistics of symphyseotomy are largely with the open operation while hebosteotomy statistics show improvement because of the use of the subcutaneous, or partially subcutaneous, method. It may be said that hebosteotomy requires special instruments which may not be at hand; it is urged, however, that hebosteotomy runs less risk of injuring the crus, the urethra and the bladder, and, being through bone, secures better union. While not favoring symphyseotomy I am free to admit that its record might be decidedly improved if the subcutaneous method were adopted.

If hebosteotomy is chosen we then have for consideration the open method of Gigli, the partially open

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method of Doederlein and the subcutaneous method of Walcher and Bumm. My very limited experience of one case with the open method, and five cases with subcutaneous method leads me greatly to prefer the latter. There is no comparison in ease of performance and simplicity of after care. Montgomery, Williams, myself and others have chosen the open method for the first operation. Montgomery without further experience says he sees no advantage in the subcutaneous method. In Williams' subsequent cases the patients were operated on by the partially subcutaneous method of Doederlein and he much prefers it to the open methods. He has not tried the entirely subcutaneous method and thinks that his success in avoiding the bladder is due to the use of the partially open method. He, however, ascribes some of the infections to the open method and thinks it possible to avoid this by having a clean assistant close the wound.

There seems to me great advantage in the subcutaneous method providing a safe means of avoiding the bladder can be obtained. In the subcutaneous methods of Walcher and Bumm a sharp needle is employed that punctures the skin. The needle which I have had constructed has a large curve which gives plenty of room to sweep around the pubic bone, even though massive—as many of them are—and still allow for abundance of adipose tissue. The needle not only offers safety to the bladder directly by reason of its bluntness but, being blunt, it can be made to grate against the bone without catching unduly and thereby avoiding contact with the bladder. If this precaution is observed the point of the dull needle is under control at all times. It will be seen that the sharp needle cannot scrape the bone and therefore may injure the bladder. The needle enters through a slight knife stab at the fissure between the labium majus and minus at the lower border of the body of the pubic bone, is made to scrape the posterior sur-

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face of this bone to its upper border, when the handle is depressed and the point made to elevate the skin above the upper border of the bone where it is brought out a slight knife puncture. During the journey of the needle, its direction is controlled by one or two fingers in the vagina. When the needle is in place it is threaded with heavy silk thread, which carries the Gigli saw, after which it is made to retrace its steps, leaving the saw in place to sever the bone. The time of performing the operation is a matter of some discussion. Some Continental writers prefer to perform the operation early in labor after which the labor is allowed to progress normally. Four of my cases were seen after the patients had been long in labor and in the other two I needed the strongest test of labor and the moderate test of the forceps to prove the necessity of the operation, so that in all cases immediate delivery was desirable or imperative, which has been accomplished in each case with forceps. Possibly podalic version might be employed to advantage in some cases looking to a better adaptation of the head, as posterior positions are common. Forward rotation has been possible in all cases.

With Williams, I have found it a great advantage to massage and stretch the vagina and pelvic floor previous to the introduction of the saw, but this is scarcely less desirable in forceps delivery and so cannot be counted as belonging to the hebosteotomy. The technic, in addition to the forceps delivery, is the introduction of the needle and the sawing of the bone with perhaps the sewing of an unusually placed tear. Some have recommended the laying of the saw preliminary to the application of the trial of the forceps but this would mean an unnecessary laying of the saw in some cases. It appears more desirable to make the required test with the forceps, failing in which, the forceps may be removed and the hebosteotomy performed after which the forceps may be reapplied. On the other hand, I do see

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great advantage in the preliminary preparation of the saw if a breech delivery or podalic version is to be attempted in cases of disproportion, as when once begun, time would not allow the introduction of the needle even if necessary to delivery, while if the introduction had taken place the bone could quickly be severed. I would here recommend the introduction of the silk carrying the saw, leaving the saw above, as this would avoid the hard rough saw between the head and the pubic bone. If delivery failed, the saw could be quickly drawn through.

The after care has been very simple in the patients operated on subcutaneously. A sand-bag has been placed on each side of the patient and a broad adhesive strap placed across the pelvis in front. In cases in which a vaginal tear occurred this was closed and a strip of gauze carried up to the bone for a few days.

MORTALITY AND MORBIDITY

Hebosteotomy is an operation of importance undertaken at times when the mother or child has undergone considerable strain and sometimes abuse. It is inevitable that it will have a mortality and morbidity but these are often the results of prolonged labor not due to the operation but due to the operation being delayed. It is an operation of weight whose dangers are hemorrhages, infection, injuries to the soft parts, etc., all the details of which cannot be discussed. It will have its greatest percentage of success in the hands of men not only trained in surgery but trained in obstetric surgery of this particular kind. It will have its greatest numerical success, although some failures, when taken to the lying-in room by all who are willing to be taught the technic and to provide the necessary saw and needle. It is not technically as difficult as repairing a lacerated pelvic floor, but that is not saying that it has no difficulties. I am inclined to think that Reed puts the matter too lightly, yet any procedure that will advance the

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obstetric art greatly must be capable of application by the many. Schläfli and others are overconservative. It is our purpose and privilege to say what is to be done with a woman advanced in labor with a living child in the presence of disproportion; it is the individual workers problem to answer the question as to his ability to carry this out in his environment.

In conclusion I would say:

1. Pregnancy fails of its fundamental purpose when it does not terminate with a living child and living mother.
2. The child has rights that the mother's wishes and convenience have no right to ignore.
3. Patients should be examined for disproportion previous to the time of delivery and if this condition is present the child and mother should be safeguarded by being placed under the best possible conditions.
4. Hebosteotomy gives a separation of 3 to 6 cm. and facilitates delivery in cases of moderate disproportion to such an extent that the mortality and morbidity to the child and mother is only slightly greater than that incident to the injuries already sustained.
5. Hebosteotomy has a field in place of craniotomy in the living child showing an improved fetal mortality of nearly 100 per cent. with slight, if any, increased mortality to the mothers.
6. It should not be elected in place of Cesarean section in patients with a true conjugate of less than 7 cm.
7. It has a wide field of usefulness in those borderline cases of patients who fail to deliver after a strong labor test.
8. A head floating above the pelvic brim after a sharp second stage indicates such a degree of disproportion as to make version and high forceps dangerous.
9. Hebosteotomy has a field in the above condition after a moderate trial with the forceps or in cases in which they cannot be conveniently and securely applied.
10. When hebosteotomy is employed after labor has long continued, the patient should be delivered immediately with high forceps or version.
11. Version should not be employed in cases with marked disproportion without a preliminary laying of the silk which is to carry the saw.

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12. The simple instruments necessary to this means of saving human life should be a part of the obstetric outfit.

100 State Street.

ABSTRACT OF DISCUSSION

DR. ERNEST G. ZINKE, Cincinnati: When advocating hebosteotomy, two years ago, before the American Association of Obstetricians and Gynecologists, I found but little sympathy, and this operation was roundly denounced at a meeting of the American Gynecological Society two years ago. With the exception of Montgomery of Quincy, Ill., Williams of Baltimore was the only one, at that time, who had performed the operation repeatedly, notwithstanding the opposition expressed. The new therapy of narrow pelvis simply implies this: We must carefully study pregnancy cases before parturition sets in. If we discover contracted pelves, these patients should be conveyed, if possible, to a lying-in hospital. When the pelvic contraction is moderate, the "test of labor" is indicated. If the passage proves too small for the passenger, the case is one either for hebosteotomy or Cesarean section. If the contraction of the anteroposterior diameter of the inlet is not below 8 or 7.5 cm., hebosteotomy is indicated; if the contraction amounts to 7 cm. or less, the case is one for Cesarean section. The new therapy of narrow pelvis has achieved wonderful results abroad, principally in Germany, Italy and France. There are on record several thousand cases of narrow pelvis in which this new treatment secured a maternal mortality of only 0.1 per cent., and a fatal mortality of between 4 and 5 per cent. What better results can we expect? Briefly stated, the new therapy of narrow pelvis at present consists of the test of labor, hebosteotomy and Cesarean section. Eighty per cent. of the women subjected to this treatment delivered themselves spontaneously without harm to themselves or their offspring; 15 per cent. were delivered by the aid of hebosteotomy, and only 5 per cent. required Cesarean section. Equally good results have never been obtained by other means in the history of obstetrics.

DR. COLLIN FOULKROD, Philadelphia: I think it is unwise to let this paper pass without saying a word from the standpoint of those few men who, Dr. Barrett says, still hold to some other views not supporting hebosteotomy. In the institution with which I am connected, we have not done it, because we have been able to save the patients without doing hebosteotomy, and because we have been led by the experience of other men to conclude that perhaps hebosteotomy does not fill the place it is said to fill. I think that men going out into the country should know something of the objections to it. In the first place some of these patients should be subjected to the test of labor; but this consists in proving without forceps whether it is possible for the head to engage in the pelvis.

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If it can, there is no question of doubt that we can bring the head out with forceps. In the class of cases in which the head cannot engage, we do not manipulate enough to have them called infected cases, and in these Cesarean section is done with good results, there being less than 1 per cent. of deaths to the mother, with 100 per cent. of living children. These cases are not in our own practice, because in our own patients we determine by measurement made before labor whether Cesarean section will be needed; but there come to us in hospital work certain cases that have been handled, and they are dealt with according to the indications; we have saved as great a percentage with Porra Cesarean section as with hebosteotomy. There are still a few men in the large cities who hold to the view that patients can be delivered by Cesarean section after a fair test of labor. Those who go out into practice should study cases to know whether to induce labor rather than do hebosteotomy. Hemorrhage is present in some cases, and unless great precaution is taken there will be failure to control it. In the second place, there will be greater lacerations by hebosteotomy than by Cesarean section in good hands. Hebosteotomy has a place in obstetrics, but the cases in which it is applicable are very few.

Dr. H. D. Fry, Washington: I expect that I am to blame for the objections that were made to this operation which Dr. Zinke refers to in connection with the American Gynecological Society three years ago. I read a paper at that time reporting some cases, and also the histories of patients who had been operated on in this country. The great objections to hebosteotomy as shown by that paper were, that there were a number of cases of lacerations from the incision into the vagina and injuries to the bladder. There were cases of hematoma, of septic inflammation and of phlebitis, and in one of the cases that I reported, the patient died on the tenth or eleventh day from embolism due to septic phlebitis. These lacerations of the vagina and injuries to the bladder are not due to the use of the needle or knife, but to the tearing of the tissues when the head, on extraction, causes separation of the bones that have been sawn apart. Another great objection to hebosteotomy and symphysiotomy is that convalescence is so unsatisfactory. The patients suffer a great deal of pain, it is difficult to draw the urine and the nurses dislike the care of these patients. I have tried repeatedly to have a special bed used, having a hole cut at the point where the buttocks will come, so that the douches may be given readily. I dread to do the operation, simply because of the unsatisfactory convalescence. I believe, however, that there is a place for symphysiotomy or pubiotomy, but I would never make the operation an elective one, as has Williams, who has done it in 25 cases, nearly every one elective, in which I should have performed Cesarean section. The patients I would treat by this operation are just

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the ones Dr. Barrett has mentioned. If I were called to see a woman who had been in labor for some hours, examined repeatedly, and on whom the forceps had been tried, Cesarean section should not be done. In such cases we must resort to hebosteotomy or craniotomy, version or high forceps. Craniotomy I do not believe is justifiable on the living child. High forceps operation in maternity hospitals has a death-rate among children of 33 per cent. Version with contracted pelves has about the same fatality; so in those border-line cases, in which we have had labor coming on, or those in which we have allowed labor to come on as a test, if the head is still not engaged and the case has the appearance of a difficult high forceps one, the time for doing a hebosteotomy has arrived.

Dr. T. Mitchell Burns, Denver: I wish to speak for symphysiotomy, not saying that hebosteotomy is not just as good. I believe to the average obstetrician symphysiotomy is a simpler operation, requires no special instruments, and gives just as good, if not better, results. I have performed this operation four times on parturient women, have operated once on the cadaver and another time on the dog. I believe preliminary operations should be done on the cadaver and the dog before one operates on the human being. In the cadaver I did not cut completely through the sub-pubic ligament, and as a result I had laceration of the clitoris. I believe that symphysiotomy or hebosteotomy may be well performed in the private house. This makes it a much better operation to consider in a great many cases in the country. All that is necessary to hold the hips together afterward is an ordinary many-tailed bandage. All the complicated apparatus is absolutely unnecessary. The patient's posture may be lateral or dorsal, or with the legs extended or flexed. She may get up at the end of two weeks or ten days even.

Dr. Channing W. Barrett, Chicago: The champions of Cesarean section did not come out so strongly as I thought they might. There was much in the paper that I would like to have brought before the Section, which I did not have time to read, and some of these points have been mentioned. One point is, that in enlarging the pelvis we have different procedures to fall back on, one of which is symphysiotomy and the other pubiotomy. The advantages of the pubiotomy are perhaps less risk of injury to the urethra, and bone union instead of cartilage union. One of the advantages of symphysiotomy, as Dr. Burns stated, is that it may be done without the instruments necessary for hebosteotomy in an emergency, and the disadvantages of symphysiotomy as taught in literature are not so great as the statistics would indicate, because the statistics of symphysiotomy are drawn from an older period than those of pubiotomy—a time when the technic was less accurate, and the statistics compare open symphysiotomy with subcutaneous hebosteotomy. If we could compare the

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statistics of subcutaneous symphysiotomy with subcutaneous hebosteotomy we might find that the statistics would be almost as good as they are in hebosteotomy. Some authors insist that the open method of one should not be compared with the subcutaneous method of the other. Subcutaneous hebosteotomy has much the advantage over the open method in the immediate time of doing the operation, the element of danger to the patient, after care, etc. Dr. Fry spoke of the precaution of having the patient supported from the side. I find that entirely unnecessary. When we cut through the bone we get just a little separation, because we have all the soft parts there to hold the pelvis. If an open operation were being performed we might need to observe this precaution. In the subcutaneous operation it is only when we draw the head through the pelvis that we get such separation as is required.

The point was made in regard to Cesarean section that the cases were chosen—that the physicians determined beforehand by measurement whether the head was going to come through the pelvis or not. They must have a very fine technic. There are some cases in which measurement would easily determine that a Cesarean section would be necessary, but that is not the average case. More frequently it is the border-line cases we meet in which a strong labor test is required to determine this. I have had opportunity to observe cases in which measurement determined that a Cesarean section would be necessary, but labor easily proved the contrary by spontaneous delivery. A slight test of labor is no test at all; it takes a very hard test to tell whether the woman is going to deliver herself spontaneously or with forceps, after which a Cesarean section may not be advisable. We see also cases in which the patients have been in labor under the hands of some one else, and they have passed the time when safe Cesarean section could be done. In hebosteotomy we have an operation that an average man can do.

Williams says, that in cases in which he is going to put on forceps or perform version, he would put the saw in position so that if version or forceps failed he could sever the bone. This is unnecessary in case the forceps are to be applied, because if the forceps fail we can take them off and then introduce the needle and saw. In version this precaution is important, but I would urge the advisability of introducing the silk that is to carry the saw rather than the saw itself, as we will not then have the rough saw between the fetal parts and pelvic bone, while if efforts at delivery fail the saw can readily be drawn through. My experience has not demonstrated that the patient has marked pain after this operation, nor that the after-care is formidable, as has been mentioned by Dr. Fry.

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OPERATION FOR RETRODISPLACEMENT OF THE UTERUS

J. M. BALDY, M.D.
PHILADELPHIA

I am not greatly interested in the minute anatomy, the exact relative normal position of the organ and ligaments when I am faced with a displacement of the uterus. There are so many factors entering into the new position, and so much uncertainty as to which one or which combination causes the trouble that the question to be solved is rather, how the uterus can he held in such a position as to relieve the untoward symptoms and at the same time do no future damage. It matters little to us whether the means used are the natural ones or not. As a matter of fact, this is exactly what is done by each and every operator without exception, no matter how learnedly in the first instance he discusses the natural supports.

In further discussion I shall merely present the procedure with which I have been experimenting for the past twelve years or so, which is, I think, fully established and amply justified by results, and which has taken the place of all other procedures in my practice for this class of cases.

The operation is not new. I first referred to it in a paper in 1902 after a few years' trial only. I have performed it almost constantly ever since, modifying it here and there at times as apparent difficulties arose and as it seemed necessary to overcome certain objections and certain faults in results; and I find at the present time a completed technic which is, I think, perfect.

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Primarily the operation was done empirically with no idea of its true mechanics; and, this being so, it may readily be appreciated why apparent difficulties were hard to overcome and why changes were necessarily but blindly made from time to time. And yet, with it all, the general principles have remained the same from the first, viz., "the round ligaments brought through an opening made in the broad ligaments and united behind and to the uterus." The proposition is simple, the resulting advantages being manifest only when the procedure is properly carried out. The mechanism is plain, but has never to my knowledge been fully appreciated or fully pointed out, even by Webster, who has for the same length of time performed an operation with exactly the same principles but varying slightly in technic.

What is the position and condition of the uterus in the normal female pelvis? The fundus is bent slightly on the cervix and well forward of the direct axis of the pelvis, it is freely movable in all directions within certain well-defined limits, moving always with the cervix as a movable pivot. The whole organ is so high in the pelvis as to allow the top of the fundus to arise well above the iliopectineal lines of the bony pelvis. The ovaries are suspended correspondingly high and rest on the upper posterior portion of the broad ligaments. Any operation which does not take these conditions fully into consideration and which does not leave the organs approximately in these conditions and positions cannot be considered as ideal.

In all the confusion of anatomy, physiology and pathology, sight is lost of the fact that in the vast majority of cases there is a general relaxation and stretching of all the supports, often of the whole of the abdominal contents, and that the uterus as well as the ovaries lie down, as it were, in the pelvis limp and inert; the stretching of the ligaments is that of overstretched rubber, not that of hypertrophy of tissue which may subsequently undergo involution. The loss of support is

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a complex one, not merely the defect of one ligament; and the ratio of loss in each individual element of support is impossible of estimation, nor is it worth while to try to estimate it. The point is not to tell just what is the degree of relaxation of one of the uterosacral ligaments or both, what that of the right uterovesical ligament or both, or what that of the broad ligaments, and then to attempt to devise an operation for each and all these supposed defects, but to recognize the fact that before us is a group of organs which for some reason or other (it matters not what) are in a false position and being so are exposed to traumatism and other influences which will eventually or have already brought about a train of symptoms which it is very desirable to abate. These organs having lost the use of their natural supports, can we successfully substitute others to take their place? These are the lines on which I have worked most successfully and this is the basis of the accompanying operation. The round ligaments are used as artificial supports in an artificial manner to accomplish what Nature originally accomplished, viz., "a uterus with the fundus forward of the direct line of the axis of the pelvis, freely movable in all directions on the cervix as a movable pivot, the fundus raised up to and above the iliopectineal lines and the ovaries swung correspondingly high and free from all attachments on the posterior side of the broad ligaments." The simple procedure of drawing the round ligaments around the posterior side of the uterus, fastening them together as they meet, and then fastening them to the uterus itself at a selected point, fulfils perfectly each and every one of these indications.

A study of the accompanying illustrations, which were drawn at the operating-table, will render the operation and its results perfectly clear.

Contrast Figure 1 with Figure 5 and note the following points: the distance from the fundus to the sigmoid, the distance from the fundus to the pubis, the

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Fig. 1.—Uterus and appendages low in the pelvis and inclined backward. This is brought out more clearly by contrasting Figure 1 with Figure 2, in which one side is raised by the fingers well up above the iliopectineal lines while the opposite side remains low down in the pelvis.

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Fig. 2.—Fundus drawn well forward and away from the sigmoid flexure; hemostatic forceps perforating the broad ligament from behind to its anterior aspect, on which lies the round ligament. A pair of tissue forceps is grasping the round ligament and carrying it into the bite of the perforating hemostatic forceps.

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height of the fundus and ovaries as shown by the shadows and the iliopectineal lines; also the uterosacral ligaments. It will readily be recognized how well forward of the axis of the pelvis the fundus is brought, how high it rises in the pelvis and how high are the ovaries and Fallopian tubes.

The question at once arises: What forces are brought into play to bring these organs into such perfect position and how do they act to retain them there?

The uterus is upheld by the encircling round ligaments (Fig. 5, *a-b*).

The ovaries and Fallopian tube are upheld by the passage of the round ligaments under the ovarian ligaments (Fig. 5, *d*).

The uterus is held forward by three forces, viz.:

1. The pressure of the intra-abdominal force on its posterior aspect.

2. The resistance of the encircling band of round ligaments (Figs. 7, 8, *B-C;* Fig. 5, *a-b*).

3. The pull forward and downward of the round ligaments at their attachment at the uterine cornua (Figs. 5 and 8, *b;* Fig. 9, *A*).

The whole structure is steadied by those portions of the round ligament running to the normal abdominal attachments (Fig. 8, *A-C;* Fig. 5, *a-c*).

It will be noted by reference to the illustrations (Fig. 2) that the forceps perforate the broad ligament close to the uterus and directly under the ovarian ligament. This is essential to the best results. A too low perforation in the broad ligament will give an unsatisfactory result. When the round ligaments are adjusted and brought snugly together posterior the ovarian ligament rests on each round ligament and without so much as touching the ovary or Fallopian tube always and with absolute certainty insures the proper and safe elevation of those organs. This is the only operation of which I know that secures this result; and if one recognizes the truth that it is often the prolapsed ovary which induces

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the symptoms, one must readily recognize the great advantage of this. When the uterus is thrown forward by almost any other operation, the ovary will usually rise in the pelvis with it, and the displacement of the two organs will be corrected at one and the same time. But every operator will recognize the fact that there is a certain large group in which the ovarian ligaments are relatively more stretched than those of the uterus, and in spite of the fundus being brought forward the ovaries are still prolapsed.

The elevation of the ovaries is not accomplished by the general elevation of the uterus alone, but is materially aided by the rolling forward a quarter of a circle or more of the top of the broad ligament owing to the pull backward of the round ligament as it passes through the hole in the broad ligament, and the more the posterior pull of the round ligament the greater the tendency to the rolling forward of the top of the broad ligament and the consequent elevation of the ovary and Fallopian tube. I have in no case seen this occur to such an extent as in any way to endanger the patency of the tube. This whole mechanism is perfectly plain when seen in the living subject and is perfectly compatible with every known mechanical law.

The second fact accomplished is that of the elevation of the uterus and everything connected with it (Fig. 5). This is brought about, of course, on principles somewhat similar to those which would be involved in grasping a boy in one's arms and lifting him up. This requires fixed points from which to act. In the operation these points are the attachment of the round ligaments to the abdominal wall, their attachments to the fundus uteri, their attachment throughout their whole course through the broad ligaments, and, finally, the artificial attachments made by the operator as they are brought together behind the uterus and stitched to that organ.

It has been said in criticism that the round ligaments will be stretched by the weight put on them and that the

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weakest part of the ligament, viz., the abdominal wall end, is the part which carries the whole weight. Only ignorance of the mechanics and the fact that the critic has not performed the operation can justify this criticism. If it be contended and believed that the weight of the uterus and pelvic organs can be sustained by the longitudinal pull on the round ligaments, as is the case in the Gilliam, the Mayo, the Montgomery, the Alexander and every other modification of this class of pure suspension operations, in how utterly prejudiced a condition must be the mind which fails to grasp the fact that the downward pull of the organs against the lateral resistance of the full length of the ligament has only a fraction of the chance of overstretching which obtains in the longitudinal pull! In the operations of the class just mentioned, pure and simple suspension operations all of them, the full success of the result depends entirely on the suspension, not another element entering into the result. Furthermore, in these operations one and all the pelvic organs are lifted by sheer force into the abdominal cavity, there to be suspended in a position they were never intended to be, with lessened mobility and the full weight of the downward drag, permanently dependent on the integrity of the round ligaments alone.

Contrast this condition with the operation under consideration. The uterus is lifted up and sustained by the encircling round ligaments as shown in Figures 6, 7 and 8. But only temporarily is this full force put on the round ligament. The fundus is thrown forward of its center of gravity, and as the patient lies on the operating-table with the abdomen open the fundus remains forward where the hand places it (Fig. 5). In this position the intra-abdominal force is exerted on the posterior aspect of the fundus, forcing it the further forward and the more surely holding it there. Gravity also aids this action.

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What occurs when the patient arises? On certain movements the fundus has a tendency to go backward. Should this occur the intra-abdominal force would soon be exerted on the anterior aspect of the fundus and the uterus would be forced to a posterior position.

In studying the mechanism of the forces at play it is soon evident that two things prevent this accident.

1. The sling back of the uterus formed by the round ligaments properly adjusted meets the force temporarily urging the fundus posteriorly and obstructs that action.

2. The force of the fundus against the encircling round ligaments causes a pull on the ligaments at their attachments to the anterior uterine wall; and the harder this pull the greater the tendency to draw the top of the fundus forward and downward and to antagonize the tendency backward.

In other words, we have two forces acting against and neutralizing the efforts of the uterus to go backward, and it is impossible for the one to be brought into play without the other instantly operating to aid it.

Until some effort of the individual causes the situation to arise which attempts to force the uterus backward, the uterus remains quietly forward by combination of gravity and intra-abdominal force, and no tension whatever, other than that which is being exerted to uphold the uterus, is put on the round ligaments. In other words, for the most part there is no pressure exerted on the round ligament at all; it is only called on intermittently and temporarily to exert itself and when it does so at all it offers two points of resistance: in the obstruction posteriorly and in the pull forward and downward at the uterine cornua, thus subdividing the work put on it.

In all the suspension operations, without exception, the full weight of the pelvic organs are permanently dragging on the normal ligaments in the most vulnerable direction. Those parts of the round ligament running to the abdominal walls are only slightly affected in

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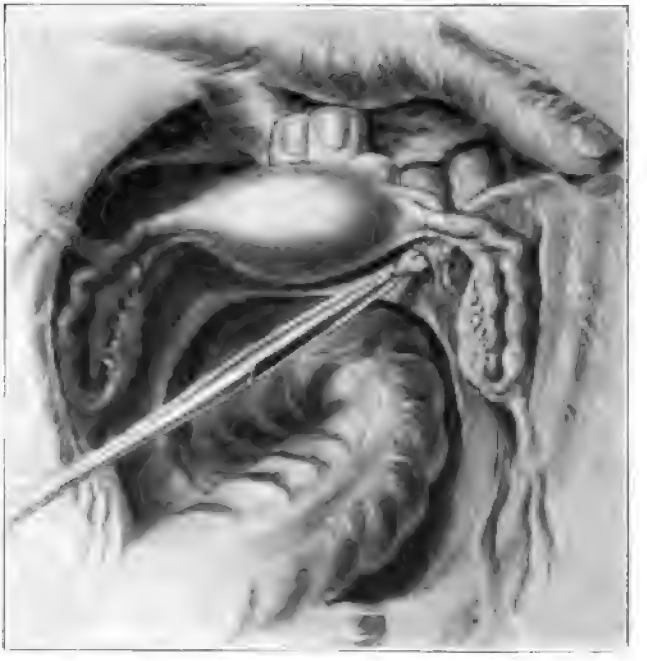

Fig. 3.—Round ligament in the grasp of the hemostatic forceps and in process of being drawn through the broad ligament to its posterior aspect.

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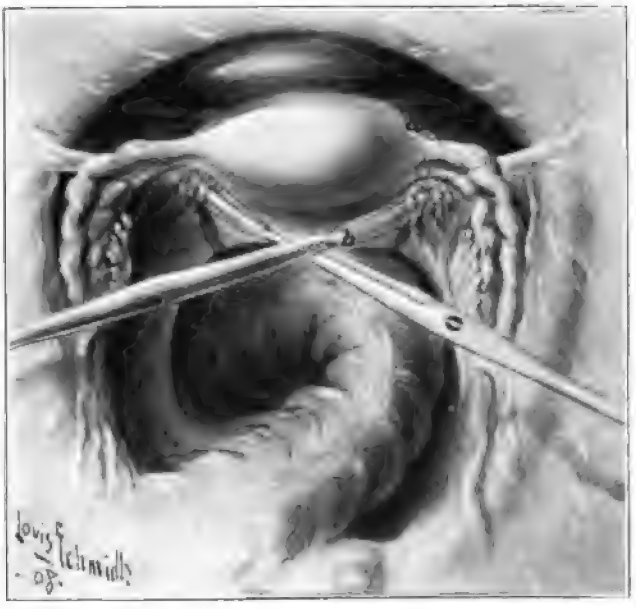

Fig. 4.—Both round ligaments drawn to the posterior portion of the broad ligament and approaching each other.

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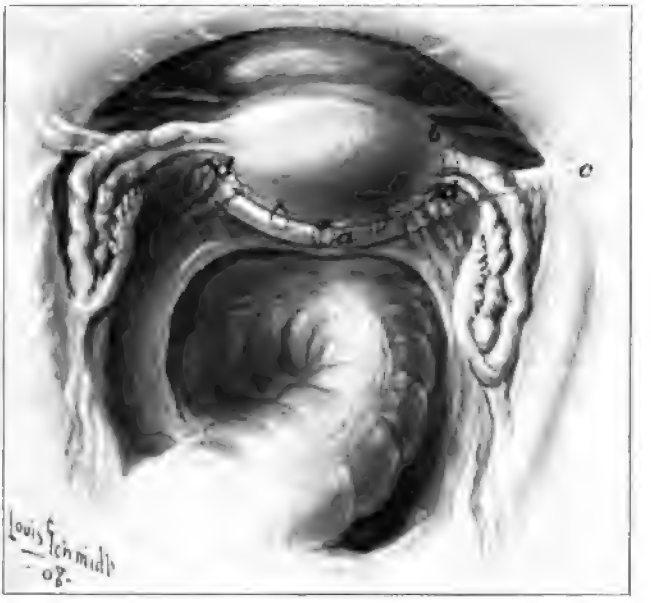

Fig. 5.—The two round ligaments united to each other, and, at two points, to the uterus itself; the operation is completed.

Fig. 6.—Uterus removed by amputation one year after operation for displacement, the symptoms not having been relieved. The round ligament can be plainly seen encircling the uterus and attached to that organ.

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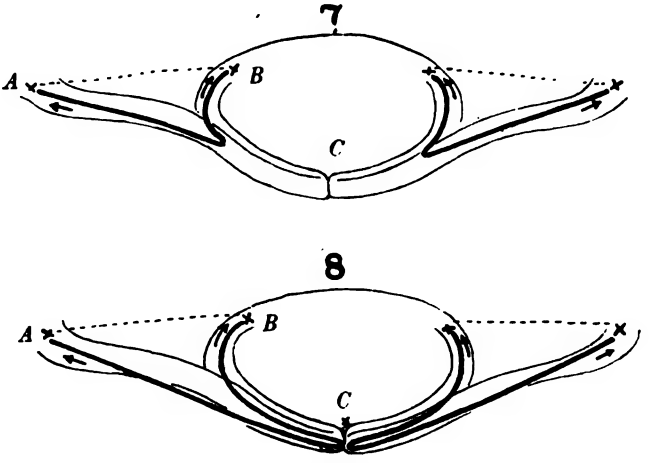

Figs. 7 and 8.—Diagrams showing the ligaments partially and completely drawn in place, as is done in the operation.

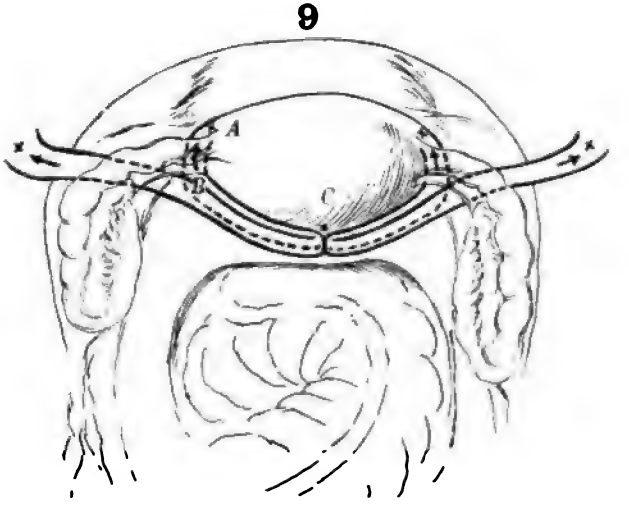

Fig. 9.—Outline sketch showing forces brought to bear and their results after operation is completed. When force is exerted on *C* backward (as would be the case if the uterus were forced back against that point) the effect on *A* will be to draw it downward and forward, provided *B* be a fixed point.

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this operation; they act mostly as guy-ropes to the whole structure, as similar ropes act in holding up a derrick, and in this operation brought into action only intermittently and temporarily. There is therefore absolutely no chance of their becoming overstretched, as has been suggested. At one time in the process of the evolution of the operation I severed these ends and did not use them at all, so little did they seem to enter into the mechanism.

For a full understanding of these important forces, study Figure 9. This represents a lateral section of the uterus, broad ligament and appendages. Take the diagrammatic lines *A, B, C*. When force is exerted on *C* backward (as would be the case if the uterus were forced back against that point) the effect on *A* will be downward and forward, provided *B* be a fixed point. A mere glance at the diagram and the line of the forces makes this clear; it is purely a question of mechanics.

In the operation point *C* of the diagrammatic line is represented by the point of artificial attachment of the round ligaments on the posterior part of the uterus (Fig. 5, *a*).

A, in the diagram is represented by the natural uterine attachments at the cornua of the uterus on its anterior face (Fig. 5, *b*).

B, in the diagram, is represented by the ovarian ligament, which is relatively a fixed point (Fig. 5, *d*).

Although the ovarian ligament is not an absolutely fixed point, yet it is sufficiently so to supply the point of fulcrum and produce the result pointed out.

The moment the uterus attempts to leave its forward position it meets the resistance of the obstruction of the encircling ligaments as well as the forward and downward pull at the anterior cornual attachments. It thus rides in a cradle as it were, movable backward and forward without ever being able to get back beyond its center of gravity or posterior to the direct line of axis of the pelvis. Hence the third force at play (the intra-

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abdominal force) is constant in its pressure on the posterior aspect of the uterus and thus trebly insures a permanent result. But one possible thing can happen to spoil the operation, viz., the complete breaking down of the suturing, which is so simple as to make that accident inconceivable.

In adjusting the ligaments as they are brought together back of the uterus care must be taken first to draw the inner circle of the doubled ligaments (Fig. 4, *a-b*) snugly about the uterus as the organ is held in a good anterior position by the hand. They are then sutured together by a single stitch. The last step is to fix the loop to the uterus by a stitch or two at a point which will insure its anterior position. It is best not to make the attachment at a point higher than necessary to secure an assurance that the fundus cannot double backward over the encircling round ligaments. This point is found with little difficulty. If this precaution is not followed, the result may be unsatisfactory.

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ROUND-LIGAMENT VENTROSUSPENSION OF THE UTERUS

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COLUMBUS, O.

As everyone is probably aware, this is the original ventrosuspension of the uterus in which the ligaments are left intact and in which the peritoneal investment is not disturbed. In devising this operation I wanted to get something that was as nearly physiologic as possible—something that would meet the requirements, without the drawbacks incident to the methods then in vogue. Especially was I anxious to get away from all fixations, as they are inherently pernicious and often fraught with disastrous consequence. The uterus is a mobile organ and cannot be fixed in any position or agglutinated to any other organ with out detriment to itself and to other organs and parts which are contiguous or correlated. It must conform to various conditions of the bladder; it must alter its position according to the fulness or emptiness of the rectum; it must yield to the impulses of respiration and adjust itself to the various movements of the body. Unless it does so, it will impinge on, or be impinged on by other viscera and both will suffer. But this is not the worst. The paramount functions of the uterus are those essentially related to the great act of reproduction—pregnancy and parturition. The bound-down uterus cannot accommodate the growing fetus and the result, in many instances, is its premature expulsion. Should the fetus go to term, as it sometimes does, fortunately or unfortunately, it will be at the expense of unequal uterine development, dis-

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tortion, changed axis, unbalanced muscular action and ineffectual expulsive effort. Such conditions at the accouchment always create consternation and too often culminate in disaster.

I shall not attempt to discuss the still mooted question as to what are the essential supports of the pelvic viscera, but there is one thing in which everyone agrees, and that is the necessity of having an intact pelvic floor to keep the viscera from settling. The first essential, then, toward correcting the backward displacement of the uterus is to restore the pelvic floor and the next is to replace the uterus and keep it there. The only way to keep it in position without compromising its usefulness is to utilize its natural guys—the round ligaments. Recognizing this fact, Alexander devised the operation of shortening the round ligaments at the inguinal outlet, and this is the basic principle of all modern operations for anchoring the uterus; but the Alexander operation makes no provision for the adherent, retroverted uterus, the condition most frequently calling for operation.

The caption of this paper signifies a suspension of the uterus from the abdominal wall by means of the round ligaments. This is a palpable misnomer, as will appear later, but was used as the most eligible term to express an approximation to the truth. Suspension of the uterus is neither rational nor feasible. None of the ligaments of the uterus, even the strongest, acts as a suspender of the uterus under normal conditions. A view of the uterus and its ligaments *in situ* will make this clear. The ligaments are all on practically the same plane with the uterus and lax; consequently, they cannot exert any suspensory influence. Should the uterus settle in the pelvis, or draw away from its moorings so as to assume a lower plane and put the ligaments on a stretch, they may, in a measure, become suspensory, but they soon prove their inefficiency by yielding to the sustained traction and thereby become

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of little value in a rôle for which they were never fitted. These little cords, like all the other uterine ligaments, are lax and allow of considerable latitude of motion backward and forward, but exert a gentle influence to prevent the organ from passing the vertical line. A slight resistance on the part of the round ligaments is ordinarily sufficient to check the backward movement of the uterus when, with the changed position of the body or the movements of respiration, the organ falls forward into normal anteposition. This, then, was the principle on which, as I believed, the solution of the question depended, and it was along these lines that the operation was devised. The fact that there have been a number of modifications of the original operation only serves to emphasize the strong probability that the principle is right and that round-ligament ventrosuspension, in one form or an other, has come to stay. Of these modifications, all of which are good and some excellent, I shall not speak, as they are each and all sustained by men of ability who are able to take care of their own. What I desire especially to accentuate in this paper and to reiterate. is the simplicity, safety and efficiency of the original operation, and its freedom from unpleasant sequelæ.

OBJECTIONS

The principal objection urged against the operation as originally devised was the danger of intestinal obstruction. This was brought forward early in the history of the operation, but of late I have heard nothing of it. That the objection was based on theoretical grounds entirely and not well founded is made manifest by the crucial test of time and numbers. Thousands of cases, during a period of more than a decade of time, have failed to furnish a single authenticated case of intestinal obstruction due solely and intrinsically to the operation.

The objection has also been advanced that after parturition the ligaments fail to exert any restraining in-

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fluence over the uterus and that that organ reverts to its original malposition. This is true, but in a temporary sense only, just as it is true of many other uteri which have not been misplaced before, and is due to the size and weight of the uterus and elongation of the ligaments—not only the round, but all the ligaments which tend to hold the uterus in place. It is not only the uterus which develops during pregnancy, but the ligaments, the vagina, and all the soft parts of the pelvis, so that immediately and for some time after delivery, the pelvic cavity is more capacious and there is not the snug relationship of organ to organ which exists in the normal unimpregnated state. In operations during pregnancy, I have seen the round ligaments greatly elongated and of a thickness equal to that of the little finger. After involution of the uterus, the ligaments and soft parts has taken place, it will be seen that the uterus has returned to its normal position and that the round ligaments are as efficient in keeping it there as before.

Again, it has been objected that the operation is too apt to be followed by suppuration. There is not force in this objection. It has been many years since I had a suppuration following round ligament ventrosuspension. True, in the beginning I had cases of suppuration, some of a most aggravated type, but as I became familiar with the manipulative details, learned to deal with the tissues gently, and acquired that automatic asepsis that comes with practice, then suppuration ceased and with it the concern for suppuration. Suppuration following this operation means the same as in any other, neither more nor less.

ADVANTAGES

Having disposed of the objections to the operation, I wish now to emphasize and reiterate its advantages. The cardinal virtues of this operation are to be found in its simplicity, safety, facility of execution and effi-

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ciency. It is so simple that any one of ordinary intelligence can understand it, and any one of ordinary surgical training can do it. It is so safe that any untoward result from it is almost inconceivable. The operation can be done with such ease and facility that with ordinary surgical skill and care there should be no question of infection or exhaustion. On this account it is especially valuable in multiple or combined operations in which it scarcely appreciably adds to the risk.

As regards its efficiciency, I have never known a failure in a properly selected case in which the work was properly done. I have had one failure in my own practice; I attempted to anchor an anteflexed and retroverted uterus, held low down in the pelvis by a rigid and unyielding pelvic diaphragm, such a uterus as one occasionally finds in the virgin, which is not amenable to treatment of any kind. In such a case the operation should never be attempted. Neither should it be attempted in any case in which the uterus and appendages cannot be freed so as to allow the uterus to occupy its normal position without tension or restraint. Such cases are, however, extremely rare. Another cause of failure, as I have observed, is careless suturing of the ligament. Occasionally the ligament is not transfixed by the suture, when appearance would indicate that it had been. This is owing, in part, to the constriction of the ligament where it passes through the abdominal parietes. In order to be sure that I have the ligament on my needle, I direct my assistant to relax traction on the ligament while the needle is *in situ,* when, if the ligament does not retract, I know I have it on my needle. I have had occasion to remove the uterus at different periods after round-ligament ventrosuspension, and have always found the ligaments firmly attached to the abdominal wall and not yielding to any traction which I was willing to exert on them. As regards pregnancy

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and parturition after this form of suspension, I have found not only no evil results, but actual improvement in conditions owing to the uterus being held in the normal position. Cases of this kind are now too numerous to require special mention. While the technic is quite generally understood, the fact that I still occasionally get letters of inquiry with reference to certain points connected with it, suggests to me the desirability of again publishing it in this connection.

TECHNIC

The peritoneal cavity is entered by an incision at the usual site between the umbilicus and pubes. Adhesions are broken up and the fundus brought forward. By lifting up the anterior surface of the broad ligament on one side on the tip of a finger applied to its posterior surface, the round ligament is brought into view and picked up either between the thumb and finger, or with a bullet forceps.

Selecting a point an inch and a half from the uterus, a thread is passed under the round ligament (with its peritoneal investment) and the ends of the thread are brought out of the opening and secured in the bite of a clamp forceps which is laid on the surface of the abdomen. The other ligament is sought for and secured in the same manner.

At a point about one inch and a half above the pubes, the peritonium, muscle and fascia on one side of the wound, are caught up by a volsella and pinned together, care being taken that the edges of these layers are in line. Traction is now made with the volsella and, with a claw retractor, the skin and superficial fat are drawn in the opposite direction, and with a sweep of the knife the face of the fascia is cleared. With a slender-nosed forceps, or better with a Cleveland ligature-carrier a stab wound is made from the surface of the fascia into the peritoneal cavity. This wound is one inch from the edge of the incision and about one

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inch and a half above the pubes. The jaws of the forceps are separated so as to make the opening large enough to permit the ligament to be drawn through it, then by depressing the handle the jaws are brought into plain view at the abdominal opening. The thread which loops the round ligament is now placed in the jaws, the clamp forceps and the perforating forceps removed, the latter bringing with it the thread and the ligament. Now, while the ligament is held taut with the loop end a quarter of an inch above the surface of the fascia, a catgut suture is passed through it including the tissues on either side, and back again where it is tied. This is cut close to the knot, the suspending thread cut on one side close to the ligament and withdrawn and the volsella and retractor removed. The other side is dealt with in like manner and the abdominal incision closed.

After both ligaments have been fastened it will be seen that an opening exists between the uterus and abdominal wall of from 7 to 9 inches in circumference, thus obviating any possibility of strangulation of the bowel. It will be observed that the uterus is not suspended but rests easily and naturally on the bladder, from which it can be raised to a position little short of the vertical. Thus the uterus is enabled to conform to the altered conditions of the bladder and rectum and to the various bodily movements. Should pregnancy ensue the ligaments develop *pari passu* with the growth of the uterus and there is neither embarassment in gestation nor difficulty in parturition.

IN PROLAPSUS

The application of this principle to prolapsus uteri is a thought of later years. Sacrifice of the uterus as in vaginal hysterectomy, does not always secure immunity from secondary prolapse of the vaginal walls, bladder or rectum. The Watkins-Wirtheim operation, while elegant and most satisfactory in the main, is ap-

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plicable only to post climacteric cases. This operation requires such extensive dissection of the bladder wall that many are loth to undertake it. Uterus fixation is temporarily, at least very satisfactory, but cannot always be relied on for staying qualities. Most of the other methods which have been proposed for this condition are obsolete. A few years ago I conceived the idea of using round-ligament ventrosuspension of the uterus with certain modifications in prolapsus uteri, and although I have used it only a few times, the results so far have been eminently satisfactory—more satisfactory than with any other method of which I have knowledge. The steps of the operation are exactly those of the ordinary round-ligament suspension with the difference that the round ligament is first drawn through the broad ligament by means of perforating forceps and the thread which is looped around it and then taken up through the abdominal wall by the same thread and in the manner already described. Of course, the pelvic floor is to be repaired as in other operations and occasionally it will be found of advantage to amputate the cervix. The patients on whom I operated suffered from aggravated complete procidentia and today they are in excellent condition with a sense of perfect comfort and well-being so far as the pelvis is concerned. I suggest it as a simple and effectual method of dealing with a very troublesome condition.

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INTRAPERITONEAL SHORTENING OF THE ROUND LIGAMENTS FOR RETROVERSION OF THE UTERUS

THROUGH THE TEMPORARILY DILATED INGUINAL CANALS AND INTERNAL RINGS, WITH CLOSURE OF THE WOUNDS BY A CAREFUL HERNIA TECHNIC

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Eleven years ago, at the Columbus session[1] of this Association, I took the initiative in this country in assailing the various fixation and artificial ligament operations for retroversion and flexion of the uterus in women who retain a capacity to conceive. At that time the results of such wrong and misdirected surgery already began to appear on the continent of Europe, and no great amount of erudition in *a priori* reasoning was required to foretell what the outcome of the same would be with us. A rationale on anatomic and physiologic grounds was then presented, showing a direct antagonism between the interests in the technic of such operations and the interests of the uterus in gestation and parturition; that either only futile or temporary results on the one hand or disasters on the other would result in a large porportion of cases. I was free to do this because it had been my good fortune to supplant the superficial, blind and incomplete simple Alexander

1. Goldspohn, A.: The Uterus; Why Vaginofixation, Ventrofixation and Ventrosuspension Thereof Should Be Avoided in Cases That Retain Any Capacity for Conception. THE JOURNAL, A. M. A., July 22, 1899, p. 181.

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operation in my practice, with a thoroughgoing intraperitoneal bi-inguinal procedure, which I had then performed over 100 times and of which I reported the remote results after an average period of two years in forty-seven cases, two months later, August, 1899, at the Amsterdam meeting[2] of the International Congress of Obstetricians and Gynecologists.

No other operation for retroversion of the uterus has been so carefully studied and so severely tested as to its ulterior results by so large a number of operators as has the Alexander operation. Most operators, especially the devotees to the fixation and artificial ligament procedures, have reported the status (often the subjective condition only) of their patients only up to the time when they left the hospital, or when they received an oral or written statement from them, or to the time of a childbirth, without regard to the position and condition of their pelvic organs after childbirth, or to the possible existence of some other concurrent affection. This is grossly insufficient and unworthy of notice by a scientific body or by a decent medical journal. Likewise it is not enough to depend on the patients' statements of their subjective conditions, but their objective anatomic status must also be obtained by a careful examination; and both the subjective and objective findings should be taken after an average interval of two years has elapsed.

Since pregnancy and childbirth are the chief functions of these organs and involve the most signal metamorphoses in them, these reproductive physiologic achievements must also be accepted as the normal standard by which to gage the merits and demerits of operations on these organs. My "double test of pregnancy" implies that the given procedure does not hinder pregnancy or induce complications for labor. This simple test of pregnancy will be readily passed by the multitude of procedures on the round ligaments, by the arti-

2. Goldspohn, A.: Am. Jour. Obst., 1900, xli, No 5.

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ficial ligament operations in most cases and the sero-serous fixations in many cases, but the severer crucial or double requirement, that displacement of the uterus will not recur after one or more subsequent labors, has been proved to be met successfully only by some of the round-ligament operations, and by none of the artificial ligament or fixation procedures in an acceptable percentage of cases. According to all real evidence or proof, so far as recorded, only round-ligament operations, and of these only those that do not place dependence on the tapering and useless distal ends of these ligaments to do any holding, are able to pass these severe but normal requirements successfully in an acceptable percentage of cases. The plain reason for this is that the round ligaments are a part of the uterus, and as such undergo with it both evolution (not stretching), during gestation and involution after labor, which is not true of any fixation or artificial ligament that human ingenuity or conceit may devise. That fact excludes all such operations aside from (1) bi-inguinal (Alexander) operation, and (2) transplantation of round ligaments into the abdominal wall by some one of the numerous minor variations in technic, all of which are fundamentally correct in principle.

What is the record of the bi-inguinal operation? In my last summary of this subject before this Section, five years ago, I reported twenty-two cases of my own, each of which had passed the double test of pregnancy successfully, after previous intraperitoneal bi-inguinal shortening of round ligaments, with the Bassini hernia technic in closure of the wounds, and with these I reported a collection of 147 similar cases by twenty-five other operators, making in all 169 double test cases. Among these were only three failures, and these were for cause: namely, two cases of prolapse in which the undue elongation of sacrouterine ligaments contraindicated round-ligament shortening alone, and in the third case

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it was due to violent intrauterine manipulation and infection by a midwife. To this collection of 169 cases there now to be added 115 more such double-test cases by the following operators: 18 by Epstein,[3] 7 by Fuchs,[4] 26 by Tillmann,[5] 14 by J. W. Taylor,[6] 28 cases by Hannes (Kustner),[7] and 22 cases by Leese.[8] Some of these operators mention a recurrence rate of from 3 per cent. to 4.5 per cent., which probably applies also to the patients that bore children. If so, we have 284 cases examined after one or more childbirths, with an average recurrence of displacement of less than 4 per cent. With such a record the results of all other operations for this purpose—aside from the transplantation of round ligaments—are not to be compared.

The recurrences have become much less frequent with those operators who have discarded the old extraperitoneal method and have drawn the ligaments out more thoroughly after dissecting back the peritoneal investment in the properly opened canal and internal ring, and have noted the proper degree of advancement of the fundus through the same. Very many operators have followed my lead to that extent in this matter, but only a small number of them have followed me to the full extent of severing adhesions by introducing a finger or two through the dilated internal ring of each side, drawing the tube and ovary into or out of this opening and resecting or removing them, as may be indicated. The ovary and outer half of the tube are suspended from the broad ligament at a point just back of the internal inguinal ring and are often drawn out of that opening more easily than into a median ventral incision. In breaking up adhesions no decent operator makes anywhere in the abdomen the enormous incision that would

3. Epstein: New York Med. Jour., 1905, lxxxi.
4. Fuchs: Zentralbl. f. Gynäk, 1905, pp. 613, 648.
5. Tillmann: Beitr. z. klin. Chir., 1907, lv, 318.
6. Taylor, J. W.: Jour. Obst. and Gynec. Brit. Emp., 1907, xii, 415.
7. Hannes: Zentralbl. f. Gynak., 1908, No. 49.
8. Leese: Monatschr. f. Geburtsh. u. Gynäk., 1909, xxix, 448.

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be required, together with more or less evisceration, in order to see these adhesions down in the true pelvis. We all sever such adhesions by the sense of touch alone, no matter by what route they are reached. This route should not be chosen for patients with immovably fixed uteri and adnexæ with indurations, etc., because this would be dangerous and a waste of labor in such cases, for the patients do not become pregnant whatever the procedure used. Their tubes are too badly injured, and therefore they are well enough served by some simple fixation or duplication of round ligaments, by way of a median section.

The reasons commonly advanced against my intra-pelvic work in my bi-inguinal celiotomy, via the dilated internal rings, are not at all the reasons why I have practically discarded this operation in recent years. I did it in over 200 cases, together with curettage and operations on the cervix, perineum or rectum in most of them, with a mortality of less than 1 per cent. I had twenty-two cases crucially tested by pregnancy and labor, without abnormality or a sign of a recurrence or of a hernia in any of them. My total recurrences of displacement were less than 1.5 per cent. without ever resorting to a pessary after operation. The reasons why I have practically discarded this operation are as follows: (1) violent appendicitis has occurred within a year or two in a number of cases in which I had the opportunity to remove the appendix, and did not do it because of sentimental reasons and because it seemed to be, and always to have been, normal; (2) according to several writers, and according to sensible *a priori* reasoning, cecostomy is preferable to appendicostomy when indicated for treatment of the colon, and (3) we find this wholly useless vestige, club-shaped or otherwise, disposed to make trouble in so large a proportion of cases, which in the past have been free of plain attacks of appendicitis. Therefore I am convinced as to my

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duty to remove this menace nearly always, especially when I open the abdomen for a relatively minor indication such as ordinary uterine displacements are. This cannot be done safely through the inguinal canal as a rule. Furthermore, it is often desirable to palpate the gall-bladder, the pylorus or a kidney, in conjunction with an operation for pelvic disorders, or to resect a dilated linea alba. All these can be done if a median ventral incision is chosen and enlarged when necessary. By the same incision the uterine displacement can also be cured in a creditable manner by transplantation of round ligaments into the abdominal wall; therefore this only real competitor of the Alexander operation properly becomes its successor. But in recent years a compromising combination has been made between a median laparotomy and shortening of round ligaments in the inguinal canals after Alexander's method. Both of these acts are done by way of a straight or curved transverse suprapubic incision, which need not always be made through the aponeurosis of the recti muscles. This affords sufficient opportunity for the required median section and also access to the inguinal canals for the Alexander operation, under intra-abdominal control of the proper degree of shortening of each ligament. This in substance has been done by Peterson,[9] Rumpf and Palm,[10] Werth,[11] Kustner,[12] Littauer,[13] and Broese,[14] and promises to become a standard procedure. The Alexander operation, thoroughly performed, however, with its principles and monumental results, before mentioned, has led the way to such still more salient procedures. It can, therefore, well rest on its laurels if it is never performed again.

9. Peterson, R.: Surg. Gynec. and Obst., 1906, iii, 85.
10. Rumpf and Palm: Ztschr. f. Geburtsh. u. Gynäk., lix, No. 1.
11. Werth: Zentralbl. f. Gynäk., 1909, No. 14.
12. Kuestner: Zentralbl. f Gynäk., 1909, No. 2.
13. Littauer: Zentralbl. f. Gynäk., 1909, p. 833.
14. Broese: Zentralbl. f. Gynäk., 1909, pp. 668, 1256.

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But to those operators, if any there be, who are still performing the original so-called extraperitoneal (?) Alexander operation, especially if without opening the inguinal canal, I would like to say with something louder than the human voice and words that they are not doing their duty by their patients; that their implied promises of best efforts and normal services held out to these patients are tinctured with fraud. This type of operation should certainly be banished, because, first, as I have repeatedly stated, the adhesions of the ovary and the outer end of the tube are much more frequent than of the uterus itself, because in their vicinity infection by way of the tubes comes first. Adhesions of these small structures are very difficult to discover and are often not suspected when the uterus is movable. They are formed on these adnexæ in their descended location, to which they sank with the retroverted body of the uterus. When the latter is brought forward into anteversion the adnexæ cannot follow, being fixed at a lower plane. The enforced tension on these structures entails discomfort to the patient, and the direction of this traction, being opposed to that of the extraperitoneally (often imperfectly), shortened round ligaments, endangers their integrity and tends to induce a return of displacement of the uterus. Such adhesions of adnexæ, beside a free uterus, are severed with the greatest ease by a finger within the internal ring, which, fortunately, is just in front of the parts.

Secondly, the round ligament does not slide or pull out from the broad ligament enough, once in every four or five individual instances (according to careful observation on this point in fully 130 cases), without some scissor-clips on the front blade of the broad ligament, which is always drawn forward into the ring. The shortened ligament then remains, pulling forward from the broad ligament at a point distant from the uterus, and therefore with little or no good effect on the

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displaced fundus uteri. This condition is very easily discovered by pulling on the broad ligament while the index-finger of the other hand is placed against the uterus through the ring, and it is just as readily relieved.

Thirdly, in the not infrequent cases of retroversio-flexion, with a heavy fundus, the center of gravity of the body of the uterus is often posterior to a line joining the points of origin of the round ligaments, while the posterior cervical supports are elongated. In this condition the round ligaments will have to be dissected out extensively from the broad ligaments, usually along with a generous strip of enveloping peritoneum, and they must be given a new course quite directly forward; otherwise traction on them from the inguinal canals is quite as likely to bring the cervix rather than the fundus forward.

That extraperitoneal (?) shortening of round ligaments is insufficient, is shown by the high percentage of recurrences of displacements, even in cases that have not been tested by pregnancy. Longyear,[15] including two cases in which he could not find both ligaments, had 12.5 per cent. failures. Hannes (Kuestner)[16] had three recurrences of displacement after nine operations performed extraperitoneally, while after sixty-two operations done with opening of the canal and peritoneum and more thorough elaboration of ligaments, the patients were found, two years later, to be without any recurrence of displacement.

CONCLUSIONS

1. The improved Alexander operation thoroughly performed has more good and approximately perfect results recorded to its credit than, so far, are recorded to the credit of all other operations combined that have been performed chiefly for retroversion of the uterus.

15. Longyear: Am. Jour. Obst., November, 1908.
16. Hannes: Zentralbl. f. Gynäk., 1908, No. 49.

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2. No Alexander operation should ever be performed without digital exploration within the pelvis through both internal rings, to prove that no adhesions remain, and to prompt and facilitate an adequate dissection of the round ligaments from the broad ligaments to give the former a sufficiently forward course to hold the fundus uteri forward effectively.

3. Prolapse of the uterus, or retroversion due chiefly to elongation of the sacro-uterine ligaments, should be treated by shortening these ligaments, when possible, or by attachment of the psoas parvus tendon or a portion of the psoas magnus muscle to the back of the cervix, in the manner suggested by Harris,[17] and never by shortening of round ligaments as the chief act.

4. Inasmuch as transplantation of round ligaments into the abdominal wall by some one of the numerous minor variations in technic, secures a creditable correction of retroversion in most cases by way of a median incision, which is also available for appendicectomy, and various desirable explorations within the abdomen, this manner of operating has largely and properly superseded the general type of operating by way of the inguinal canals.

5. A plan of operation that is still more correct anatomically and surgically, has, in recent years, been carried out by at least seven operators with satisfaction. It consists in doing first, a sufficient median laparotomy and the required intraperitoneal work, and secondly, in shortening of round ligaments within the opened inguinal canals themselves, both by way of a transverse suprapubic incision, either straight or curved upward and extending through the aponeurosis of the recti muscles, as may be required.

2120 Cleveland Avenue.

17. Harris, M. L.: A New Operation for Prolapse of the Uterus, THE JOURNAL, A. M. A., May 14, 1910, p. 1605.

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RETROPERITONEAL SHORTENING OF THE ROUND LIGAMENTS

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I take it that the following propositions are generally conceded, and are accordingly excluded from this discussion.

1. Many displacements cause no symptoms and require no treatment.
2. Many displacements cause discomforts which may be easily and completely relieved by well-fitting pessaries.
3. In many instances discomforts due to displacements could be best relieved by operation were there not complicating affections, pulmonary, cardiac, renal, thyroid, etc., which would render operation unduly hazardous. In such cases pessaries serve a useful purpose.

There remain, however, many displacements, some simple and others complicated, which require operative correction. It is to this class alone that my remarks will refer.

The last decade has done much to crystallize our views regarding the normal position of the uterus, the mechanism of posterior displacements, the rôle played by coincident affections and the relative degrees of discomfort due to each and the many ways by which displacements may be corrected, with their respective advantages and defects.

NORMAL POSITION

The normal relative positions of the uterus and vagina are rarely given in text-books of anatomy, obstetrics or gynecology. Dissections and frozen sections of

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Fig. 1.—Normal acute angle between the uterus and vagina. Intra-abdominal pressure, exerted from above, closes the vaginal slit firmly, thus preventing prolapse.

Fig. 2.—Cystocele and rectocele. Cervix permitted to move forward by relaxed broad and sacro-uterine ligaments. When the foregoing occurs the uterus and vagina are in approximately the same vertical line. It is then just a question of time when the uterus will telescope into and through the vagina.

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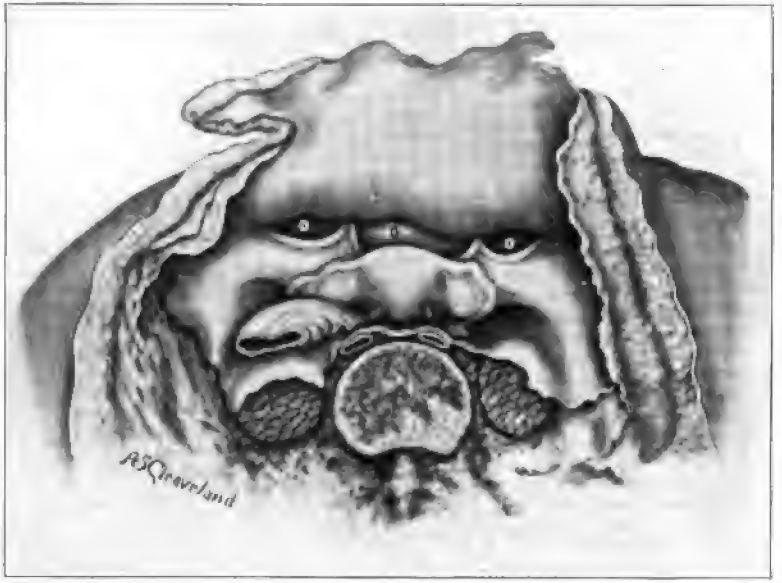

Fig. 3.—In common with other forms of transperitoneal suspension of the uterus, the Gilliam operation leaves firm bands of tissue stretching across the free abdominal cavity. R. L., round ligaments stretching across the free abdominal cavity, leaving three openings (O), through which it is possible for a loop of intestine to slip and become strangulated.

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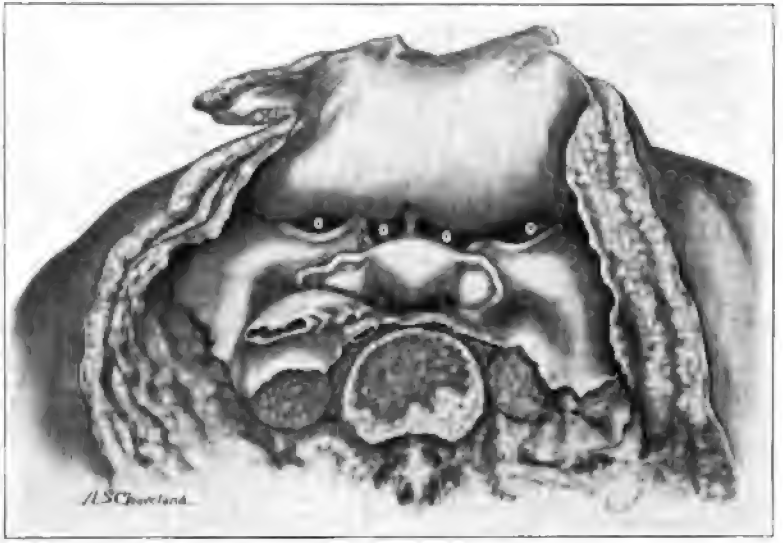

Fig. 4.—If by chance the ligaments should be overshortened and the fundus held in contact with the abdominal incision, the two surfaces become adherent. A suspensory ligament would be added and we would have four openings through which an intestine might slip and become strangulated. R. L., overshortened round ligaments and resulting suspensory ligaments (S. L.) which stretch across the free abdominal cavity, leaving four openings (O) through which an intestine might slip and become strangulated.

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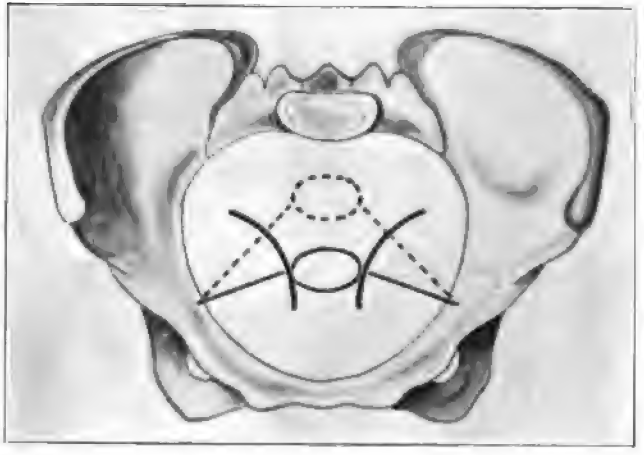

Fig. 5.—Heavy straight lines indicate normal direction of round ligaments. Dotted lines show the slight degree of stretching which will permit the uterus to become retroverted.

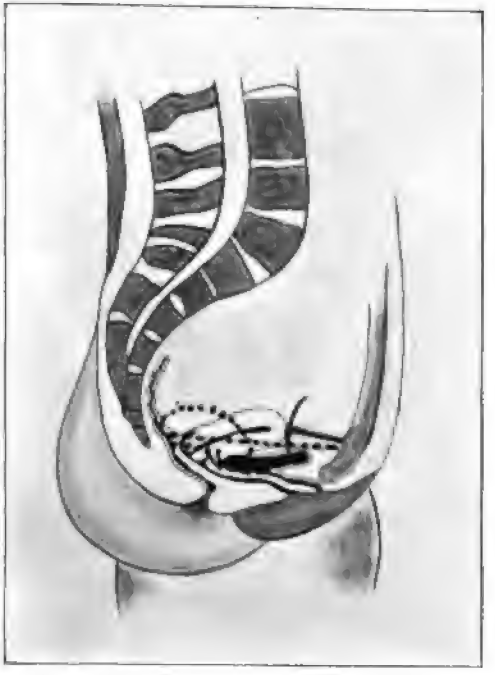

Fig. 6.—Heavy lines represent the shortened round ligament, which is directed forward. Dotted lines represent the marked stretching of the transplanted round ligaments that must take place before retroversion can occur.

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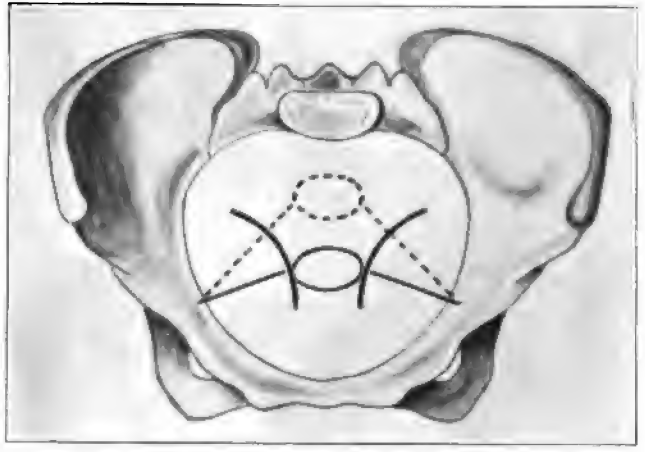

Fig. 5.—Heavy straight lines indicate normal direction of round ligaments. Dotted lines show the slight degree of stretching which will permit the uterus to become retroverted.

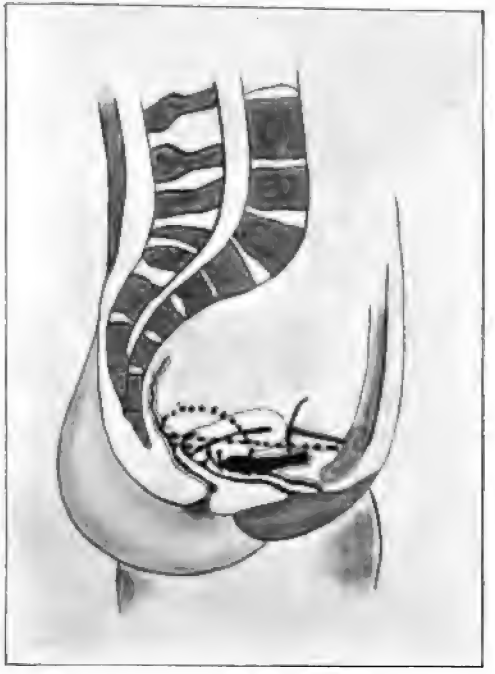

Fig. 6.—Heavy lines represent the shortened round ligament, which is directed forward. Dotted lines represent the marked stretching of the transplanted round ligaments that must take place before retroversion can occur.

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the female pelvis are misleading. They are usually made after fermentation has caused distention of the alimentary canal, including the rectum. The anterior and posterior walls of the rectum are normally in contact except when gas is being expelled, or at the time of defecation. Text-book illustrations usually show the rectum enormously distended. Adapting the illustrations of four well-known text-books to the scale of a normal mature woman, we find both the rectum and the vagina inflated to a diameter of 1½ to 3 inches. This inflation of the canals occupies nearly the entire antero-posterior diameter of the pelvis. This distortion pushes the uterus and vagina forward, making them almost vertical, and almost in a straight line. As they appear to be on end the uterus is raised from its normal pelvic position to become an abdominal organ.

Normally, however, the vagina is almost horizontal, runs almost directly backward, and the uterus is directed forward at an acute angle. This horizontal position exerts an important influence in preventing prolapse, whereas the vertical position favors telescoping.

We have three chief factors which prevent uterine prolapse or hernia: (1) the pelvic floor; (2) the uterine ligaments, and (3) the normal acute angle between the uterus and vagina (with the cervix as a fairly fixed point), which causes the intra-abdominal pressure exerted from above to close the vaginal slit firmly.

It is a wise provision of Nature that normally closes the oblique opening through the pelvic floor ever more tightly as intra-abdominal pressure increases. This is effected by rendering the vaginal canal and the uterus which run in opposite directions, more and more nearly parallel and horizontal. This method of closure is analogous to that of the ureter as it enters the bladder.

In order that the uterus may remain in its normal position it is necessary to maintain to a considerable degree the functional value (1) of the pelvic floor; (2)

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of the supporting ligaments which radiate from the cervix, and (3) of the round ligaments, which act as guy-ropes.

MECHANISM OF RETROVERSION AND OF PROLAPSE

With the cervical attachment of the base of the broad ligaments acting normally as a pivotal point, the fundus will remain forward if the round ligaments are normal. If the round ligaments are stretched (as by a fall or after delivery), however, the fundus may turn backward to any degree, though the integrity of the broad ligaments and of the pelvic floor remains unimpaired. As a matter of fact, however, posterior displacements are very often, if not usually, accentuated by an injury to the pelvic floor or by stretching of the supporting (i. e., radiating) ligaments, or by both.

Should both these supports be impaired at the same time, however, (i. e., the pelvic floor and radiating ligaments) the direction of both the uterus and the vagina is rendered more nearly vertical and they assume more nearly a straight line. When such mechanical conditions exist, it is easy for the uterus to be telescoped into and through the vagina. Such a prolapse implies:

1. A shortening of the posterior wall of the vagina as by a perineal tear.
2. The stretching of the sacro-uterine ligaments permitting the cervix to move forward.
3. Elongation of the round ligaments permitting the fundus to tilt backward.
4. Stretching of the broad ligaments, permitting the uterus to sag downward.

The degree of prolapse and the speed with which it develops varies with the type of work and other causes for varying intra-abdominal pressure, such as straining at stool, etc.

COINCIDENT AFFECTIONS

In my experience about 70 per cent. of patients requiring operation for posterior displacements of the uterus

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have also suffered from associated disease of the ovaries, tubes or appendix. Fortunately, the medical profession has emerged from that period when it was customary to attribute discomforts of doubtful origin to the genital tract.

By virtue of close scrutiny and strict adherence to the laws of inductive and deductive logic many so-called reflex uterine pains have been reduced to their correct analysis and have assumed the concrete form of gall-stones, gastric and duodenal ulcer, floating kidney, ureteritis, chronic appendicitis, hyperthyroidism, incipient tuberculosis, relaxation of the sacroiliac joints and other postural defects with consequent muscular and ligamentous strain, etc.

The medical profession and womankind owe a lasting debt of gratitude to Drs. Reynolds, Lovett, Goldthwaite and others for demonstrating the frequency with which backache is due to postural defects and rendering it easy to differentiate between the several types of pain.

Our chairman, Dr. Clark, has wisely emphasized the importance of making an itemized record of the several disease conditions affecting the individual patient; of the percentage in which they contribute to her discomforts, and of the extent to which each may probably be relieved by the proposed plan of treatment.

In this day of safe surgery, many people expect too much from operations and one will reduce the frequency and degree of disappointment if he strives to tell the individual patient beforehand just which of her discomforts may *not* be relieved by the operation. This enables the patient to decide judiciously regarding a plan of treatment.

OPERATIVE CORRECTION

It is needless to review here the evolution of the various procedures or to enumerate the several operations and modifications which hold the uterus forward. Each of the several recognized avenues for surgical correction

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have their advocates who have modified the following types of operation:

1. Inguinal shortening of the round ligaments (Alexander, Edebohls, Martin, Goldspohn).
2. Vaginal fixation of the uterus and vaginal shortening of the round ligaments (Goffe, Schuching, Duhrssen, Maskenrodt, Vineberg, Reed, Wertheim).
3. Intra-abdominal shortening of the round ligaments (Polk, Wylie, Dudley, Mann, Bissell, Morris, Baldy).
4. Attachment of round ligaments posterior to the uterus (Webster and Baldy).
5. Attaching the uterus to the anterior abdominal wall firmly, loosely, indirectly (Kelly, Fowler, Martin, Dorsett).
6. Transperitoneal shortening of the round ligaments (Olshausen, Ferguson, Beck, Gilliam, Martin, Barrett, Campbell, McGannon).
7. Retroperitoneal shortening of the round ligaments (Simpson, Noble, Montgomery, Mayo, Peters).
8. Shortening of the sacro-uterine ligaments through the abdomen or vagina (Bovée, Bishop, Stoner, Young).
9. Transverse attachment of the base of the broad ligaments in front of the cervix.
10. Intra-peritoneal shortening of the round and broad ligaments (Coffey).

The uterus may be held forward by any one of several satisfactory methods.

In order that the uterus may remain in its normal position, it is necessary to maintain, to a considerable degree, the functional value, first, of the pelvic floor; second, of the supporting ligaments which radiate about the cervix; and third, of the round ligaments which act as guy-ropes. I take it that correction of mechanical defects of any of these structures constitutes an essential part in the several operations considered in this symposium.

The principles of safe and effective correction are simple. They not only take into consideration the normal position of the genital organs and the mechanism of displacements, but also the existence of other pelvic viscera (intestines, bladder, ureters) and the accidents common

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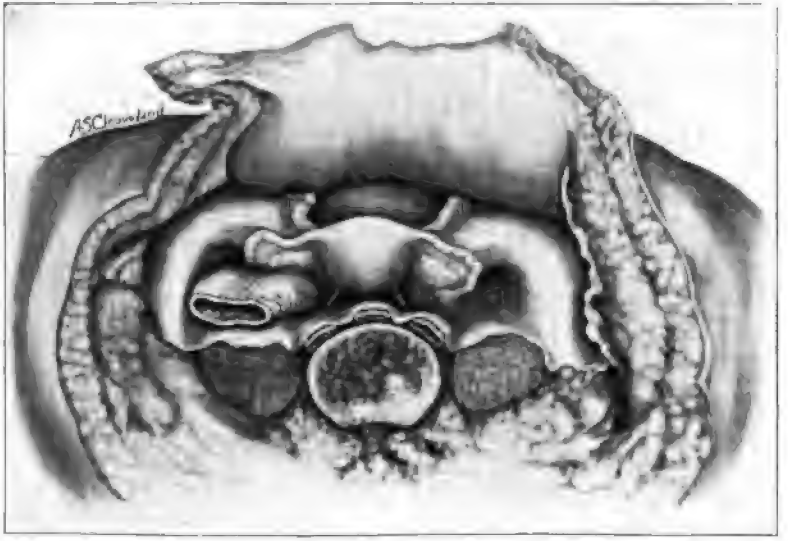

Fig. 7.—Uterus held in normal position by ligaments shortened and directed forward behind the parietal peritoneum (P).

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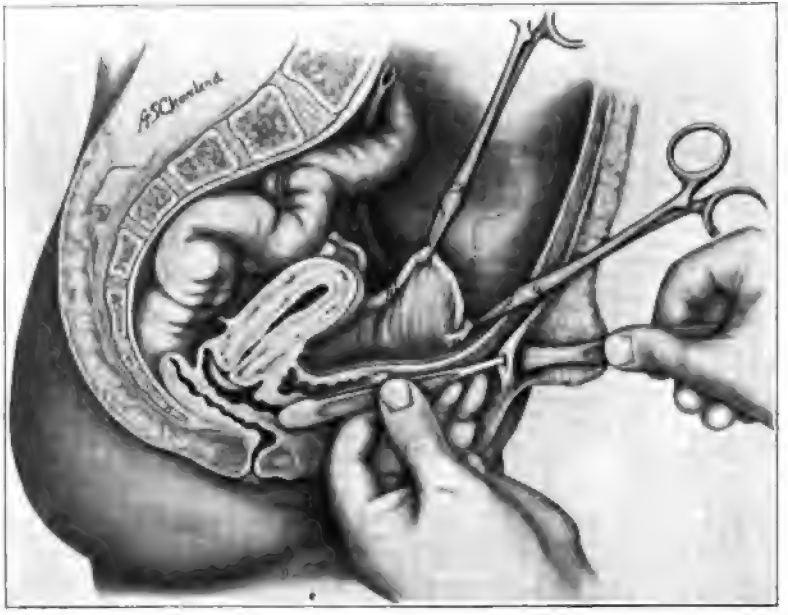

Fig. 8.—First step in retroperitoneal shortening of round ligaments. Landmarks are fixed by guide forceps preparatory to passing curved forceps in manner suggested and practiced by Drs. Charles H. Mayo and Barrett. R. L., round ligament grasped about 1½ inches from uterus. P., parietal peritoneum overlying internal ring picked up, as suggested by Dr. S. A. Chalfant.

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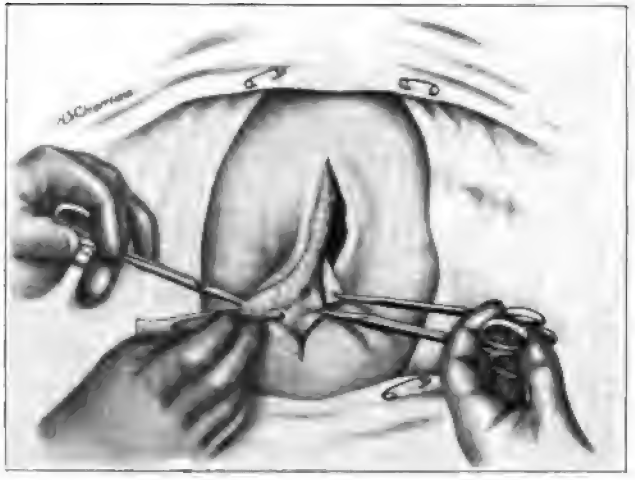

Fig. 9.—Second step: The skin is retracted and the fascia punctured about 1½ inches to the side of the lower angle of the incision.

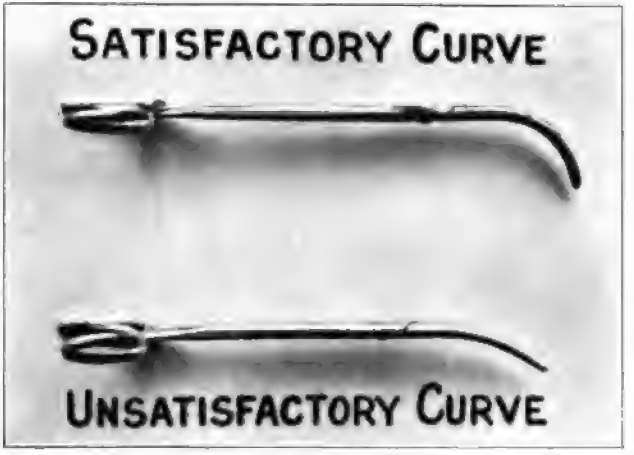

Fig. 10.—Forceps of satisfactory and unsatisfactory curve.

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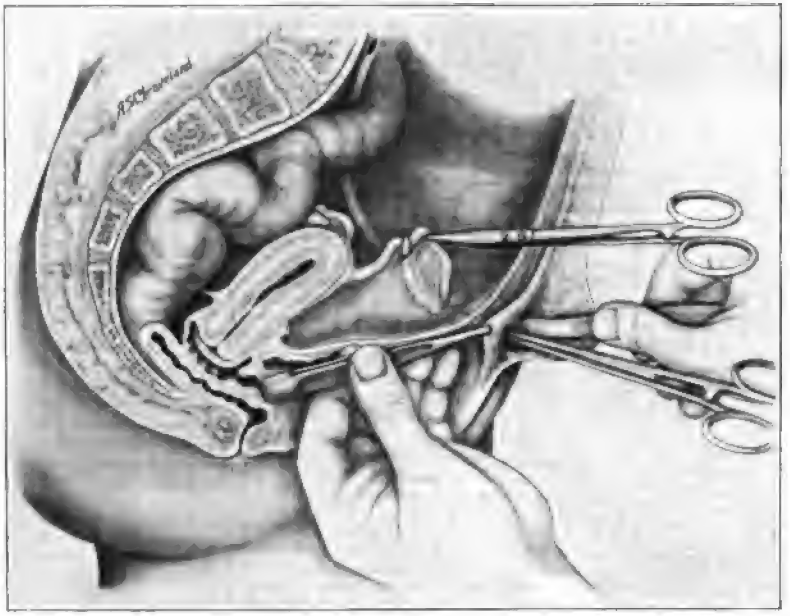

Fig. 11.—Third step: The forceps of proper curve, having passed through the fascia and obliquely through the rectus muscle, skirts beneath the parietal peritoneum to the internal abdominal ring, where it passes between the layers of the broad ligament and follows the course of the round ligament to 1½ inches of the uterus. At that point it penetrates the peritoneum entering the peritoneal cavity for the first time, and then grasps the round ligament proximal to the guide forceps (G. F.).

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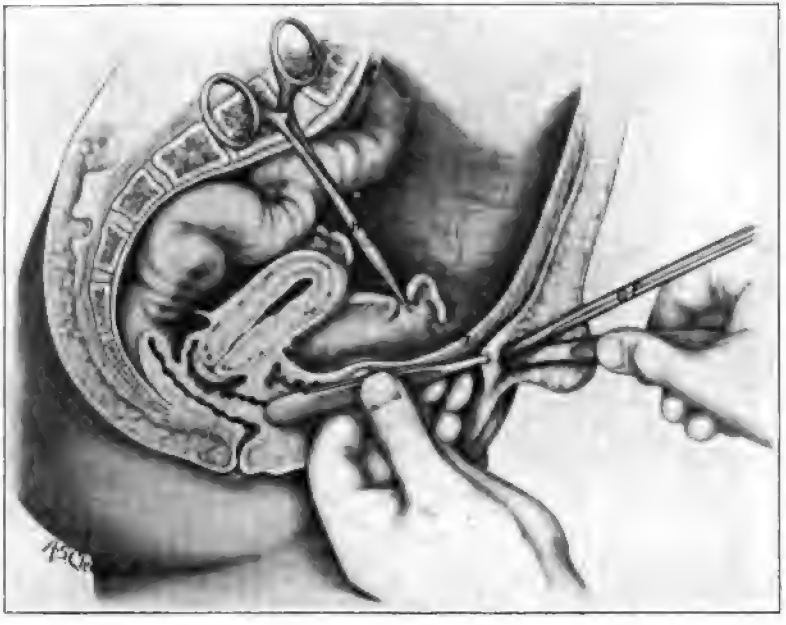

Fig. 12.—Fourth step: The margin of peritoneal wound having been caught by hemostatic forceps (H), the curved forceps (C. F.) grasps the round ligament. By withdrawal of the curved forceps the round ligament is drawn out through the canal made by the forceps.

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Fig. 13.—Final step: The round ligament (R. L.) is suspended beneath the fascia by a linen suture (L. S.) which also closes the rent in the fascia. The same process is repeated on the opposite side. Method of fastening shown on the margin.

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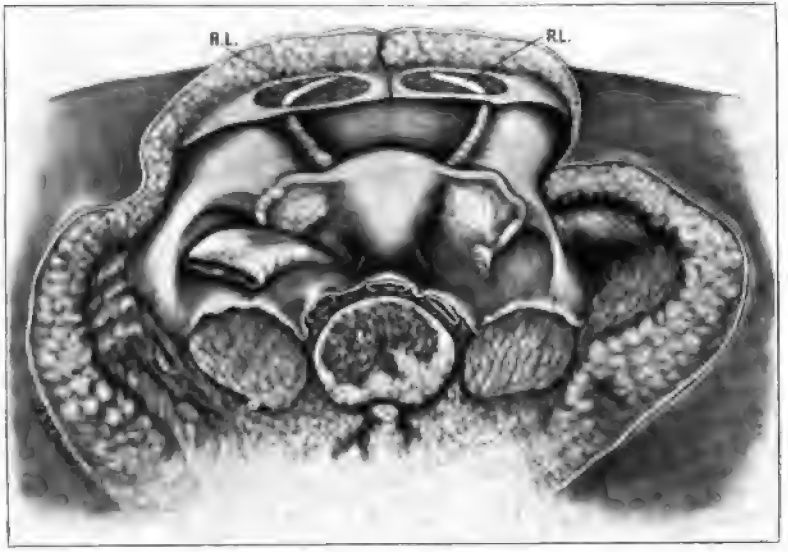

Fig. 14.—Retroperitoneal course of the round ligaments fastened beneath the fascia. P., folds of peritoneum covering the round ligament. R. L., round ligament as it lies in its oblique course through the rectus muscle and attached to the under surface of the fascia.

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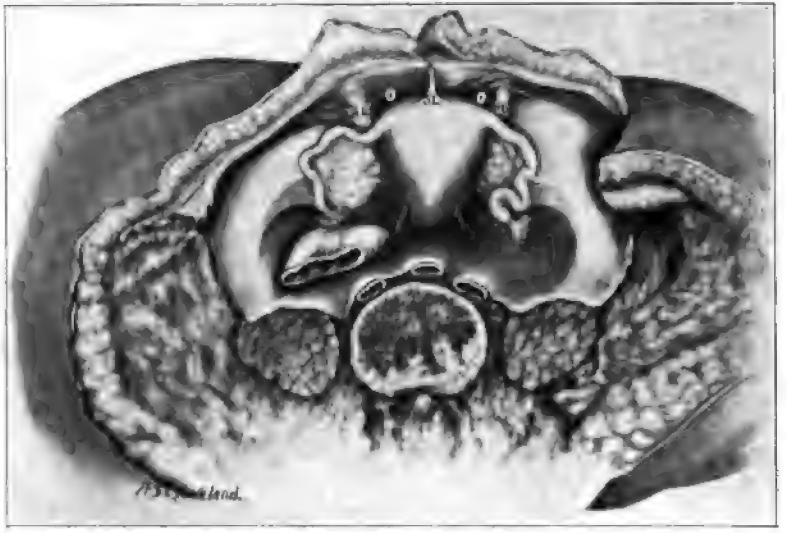

Fig. 15.—If the round ligaments are caught too near the uterus or if they are fastened together at the mid-line (either above or below the fascia) a suspensory ligament will likely be formed. Dotted lines show the retroperitoneal course of round ligaments which are fastened together in the mid-line S. L., which is the dangerous suspensory ligament so likely to form if this error is made.

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to them. The value of an otherwise satisfactory operation may be impaired by a considerable percentage of failures; by interfering with the function of reproduction; by causing considerable pain; by leaving bands of adhesions stretched across the free abdominal cavity; by entailing too great a risk to life or by frequently substituting other types of pathologic conditions which are themselves a source of considerable inconvenience.

It has always seemed to me that when skill, technic, facilities and other conditions justify elective operations, the mere fact of opening the abdomen does not necessarily entail serious risk. When the abdomen is opened, one can occasionally detect and correct associated troubles which would otherwise continue to cause discomfort. For these and other reasons, I am inclined to look with favor on the operation which opens the abdomen in the mid line, thus making it possible to investigate all areas of discomfort.

At the time the Gilliam operation was first proposed, I was much impressed by the fact that if considered from the standpoint of the genital tract alone, it was simple and based on effective mechanical principles. The strong part of the round ligaments was used.

The ligaments were directed forward thereby giving them greater retaining power. The effect of that manner of attaching the ligaments was not to suspend the uterus, but to keep the fundus from rising and describing its backward arc of a circle.

The shortened ligaments would undoubtedly undergo the same changes of hypertrophy and involution common to normal ligaments in the course of gestation and the puerperium. Thus far the operation was ideal.

But in common with other forms of transperitoneal suspension, firm bands of tissue were stretched across the free abdominal cavity.

If by chance the ligaments were overshortened, and the fundus of the uterus held in contact with the abdominal incision, the fundus would become adherent.

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A suspensory ligament would be added, and we would then have four openings through any one of which it seemed possible an intestine might slip and become strangulated.

It occurred to me at that time, as doubtless it did to many others, that if this possible source of danger could be avoided, the operation would be well nigh ideal. At the Cincinnati meeting of the Southern Surgical and Gynecological Association in November, 1902, three papers were presented, each describing a method of utilizing the strong points of the Gilliam operation but obviating its dangers by effecting the shortening and transplantation beneath the parietal peritoneum. The first of these papers was read by Dr. A. H. Ferguson of Chicago; the second by Dr. George Noble of Atlanta, and in the third, I presented a preliminary report regarding the technic of a similar retroperitoneal operation.

The underlying principles of my operation were then described as follows:

It consists essentially of changing the course of the round ligaments from a transverse to nearly an anteroposterior direction; in shortening the round ligaments so as to leave the distal end slack; the proximal end being used to control the movements of the uterus; finally, and especially, in effecting these changes beneath or by puckering the parietal peritoneum, thus leaving no bands of adhesions and no pockets which may strangulate an intestine. These principles have commended themselves to me as being mechanically and surgically correct. Varying details of technic will readily suggest themselves to the operator.[1]

That this observation of eight years ago was fully warranted is shown by the subsequent publication of a considerable number of modifications of the three operations proposed at that meeting.

TECHNIC

My own technic has undergone several minor changes but has gradually settled down to that which we have

1. Am. Jour. Obst. and Dis. Women and Children, N. Y., 1903, xlvii, No. 2.

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employed for several years and considered safe, to a high degree effective, and as free as any abdominal operation of any kind can be, from the risk of adhesions. It has no bands stretching across the free abdominal cavity and carries no essential danger of strangulation. Except in two cases, it has caused no dragging sensation during pregnancy, or at any time, except during the first few days of the healing process.

Notable modifications have been made by Dr. Montgomery, Dr. Charles H. Mayo, Dr. Barrett and others. The operation as it now stands is a composite one. It consists in the following steps:

1. A median abdominal incision is made.

2. The round ligament is caught 1½ inches from the uterus and the parietal peritoneum at the point of the internal inguinal ring (Fig. 9).

3. The skin is retracted and the fascia punctured about 1½ inches to the side of the lower angle of the incision (Fig. 10).

4. A forceps of proper curve passes through this puncture, obliquely through the rectus muscle, following the method of Dr. Charles H. Mayo, and enters the broad ligament at the internal ring. It then continues to pass beneath the peritoneum and by the side of the round ligament until it reaches the hemostat holding the round ligament.

5. The curved forceps then penetrates the peritoneum and grasps the round ligament. The free margin of peritoneum is held by a hemostat during the next step.

6. The curved forceps is drawn out bringing the round ligament through the tunnel it has made.

7. The round ligament is then fastened and suspended just beneath the fascia by a linen thread which closes the rent in the fascia and at the same time holds the ligament firmly. The same process is repeated on the opposite side.

Some features and variations in technic and subsequent care which deserve comment are the following:

1. The ligament should not be attached to the upper surface of the fascia. Any permanent perforation of the fascia invites hernia.

2. The operator should actually see that his suture attaches the ligament to the fascia rather than to the fat overlying the fascia.

3. If the round ligaments are caught too near the uterus, or if they are fastened together in the mid line (either above

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or below the fascia), the uterus will be held in contact with the line of incision and a suspensory ligament will form. In one of my early cases that happened. The intestine became adherent, slipped behind the suspensory ligament (which should never exist) and annoying cramps followed, requiring operation.

RESULTS

1. *Mortality.*—I have done this operation with modifications, and in connection with necessary plastic and other work, about 400 times. There have been two deaths, giving a mortality of 0.5 per cent. In about 70 per cent. of these cases, the appendix, tubes and ovaries, or adhesions required attention. During the last few weeks, I have gained definite information regarding about 75 per cent. of the patients. Regarding the other 25 per cent., either nothing has been heard from them or their physicians, or else the doctor has reported that his information is neither recent nor exact. These facts have been obtained in two ways: first, from the medical attendants who have recently seen and examined the patients; and second, from my own notes made at the time of recent examinations. This inquiry includes:

2. *The Present Position of the Uterus.*—In two cases the uterus is known to be retroverted but without discomfort. Three or four uteri with congenital defects are about in the long axis of the body. Four with prolapse are known to have the fundus forward, but the cervix was not held well back by the plastic operations and shortening of the sacro-uterine ligaments. In three cases after delivery the uteri were back at about the sixth week, but were permanently corrected by the temporary use of pessaries. In all the other cases, that is, in more than 97 per cent. of those heard from, the uterus is in the normal position.

3. *Pregnancy.*—For various reasons (patients unmarried, widows, passed menopause, operation required removal of one or both adnexa, etc.), 40 per cent. of those heard from would not be expected to conceive. Of

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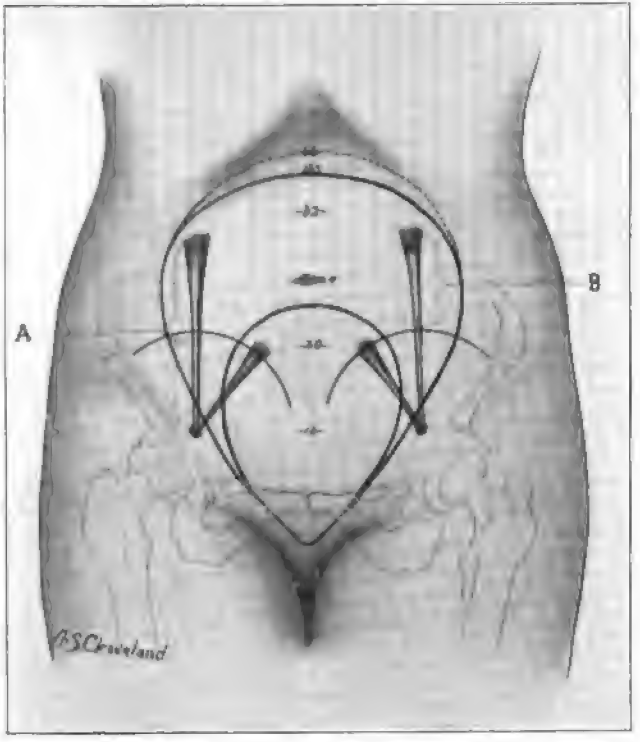

Fig. 16.—Immediately after delivery the uterus is markedly reduced in size and length. The length of the round ligaments is gradually reduced. For days they are long enough to permit the uterus to fall back into the hollow of the sacrum. If it remains back during the puerperium, the ligaments will be permanently stretched. A, total length of round ligament at the beginning of labor. B, excess of ligament at the end of labor.

Fig. 17.—A low attachment of the bladder to the cervix, and a high attachment of the sacro-uterine ligaments. This faulty leverage must be overcome to ensure the success of any corrective measures.

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the remaining 180 patients heard from, forty-five have conceived. One patient is now normally pregnant three months; one patient is now normally pregnant four months; two patients are now normally pregnant six months; two patients are now normally pregnant eight months, and one patient is now normally pregnant nine months.

Nine have aborted; four had aborted before; two of them probably had syphilis; in two no cause was known by the attendant. Three of these also bore one child. One had an ectopic gestation. Twenty-three bore one child at the end of normal pregnancy. Three of these also aborted once each. One of this number died of puerperal infection seventeen days after a normal delivery. Five have had two children at the end of normal pregnancies.

4. *General Health.*—This has been very markedly improved or completely restored in 82 per cent.

Little or no improvement..	15 cases	5 per cent.
Somewhat improved	38 cases	13 per cent.
Markedly improved 128	cases	43 per cent.
Completely restored 117	cases	39 per cent.

5. *Local Discomforts.*—These were very markedly or completely relieved in 84⅔ per cent.

Little or no improvement..	10 cases	2 per cent.
Required second operation for cystic ovaries after which relief was complete	6 cases	2 per cent.
Somewhat improved	28 cases	9⅓ per cent.
Decidedly improved	72 cases	24 per cent.
Completely relieved 182	cases	60⅔ per cent.

6. *New Local Discomforts.*—Here inquiry was especially made regarding dragging sensation in the new course of the ligaments. New discomforts were noted in two or less than 1 per cent.; *no* new local discomforts in 296, or about 99 per cent.

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My percentage of partial or complete failure to hold the uterus forward has been about 2 per cent. No round-ligament operation alone will be uniformly successful under the following conditions:

1. When the ligaments are very delicate. I have had one failure due to this cause.

2. When the congenital attachment of the bladder is low and that of the sacro-uterine ligaments is high. This defect must also be corrected. I have had three or four partial failures due to this cause.

3. When the sacro-uterine ligaments and the base of the broad ligaments have been very much stretched, giving a decided prolapse. These defects should also be corrected (as, of course, the underlying lacerations). I have never had difficulty in keeping the fundus forward, but I have occasionally had an imperfect result because my attempts at shortening the sacro-uterine and the broad ligaments were not always perfectly satisfactory. I have knowledge of four cases of this kind.

The ligaments undergo the normal course of hypertrophy and involution during pregnancy and the puerperium. It is attended by slightly less risk of post-partum retroversion than follows delivery where the uterus has never previously been misplaced. This less risk is due to the anterior direction of the ligaments. Puerperal retroversions are easily and permanently corrected by the temporary use of pessaries and it is the imperative duty of the obstetrician to see that every uterus is in its normal position for at least three months after delivery, whether there has been previous trouble or not.

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PLICATION OF THE ROUND AND ANTERIOR FOLD OF THE BROAD LIGAMENT ON THE ANTERIOR SURFACE OF THE UTERUS FOR RETRODISPLACEMENT

R. C. COFFEY, M.D.
PORTLAND, ORE.

ANATOMIC AND SURGICAL PRINCIPLES

This presentation is made more to illustrate the anatomic and surgical principles underlying the entire subject of the treatment of retroversion, than to set forth any specific mechanical detail. The uterus is very largely an intra-abdominal organ. All intra-abdominal organs are supported almost entirely by peritoneal folds. The peritoneum is supported in turn by a loose connective tissue which holds it loosely but persistently to the abdominal wall except at its upper attachment, where it is firmly fixed and blended with the diaphragm. Strictly speaking, the abdominal organs, which we refer to as intra-peritoneal, are all extra-peritoneal, inasmuch as every organ lies between two layers of peritoneum made as if the organ had been pushed into the peritoneal sac from the outside, and had become adherent to it.

New ligaments are formed during fetal development and rotation, by the contact of two peritoneal surfaces which adhere, blend, and become obliterated at point of contact. This may be illustrated by the rotation of the colon, which goes upward and to the right and adheres to the peritoneum of the posterior abdominal wall and thereby forms the mesocolon. The spleen rotates to the left, comes in contact with the peritoneum

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of the posterior abdominal wall, adheres to it, obliterates the endothelial coverings and thereby the ligament of the spleen is formed and it is fixed on the left side. The omentum grows from the lower border of the stomach down over the transverse colon and adheres to it at the point of contact, its surfaces blend and we have the gastrocolic ligament or gastrocolic omentum. If the peritoneal surface of the stomach is plicated by bringing the anterior superior border and the anterior inferior border together and holding them firmly by peritoneal sutures, all of the space enclosed by this line of sutures becomes obliterated. If the omentum is sutured to the abdominal wall and held firmly, the surfaces blend and a complete partition is made across the abdomen. If the lesser omentum is plicated for a gastroptosis, Beyea has found that the surfaces blend and the omentum or ligament is permanently shortened.

The Kelley operation proves more conclusively than anything else the almost absolute certainty of the blending of peritoneal surfaces, for we find that in only a small percentage of cases done by Dr. Kelley's operation, which does not use one-twentieth the amount of peritoneum found supporting other organs of equal weight, does the uterus fall backward, and in nearly all of those cases in which the uterus does fall backward, the ligament is found, not broken, but attenuated to a thread. This operation has probably been done more times than any other intraperitoneal operation, with the exception of the removal of the appendix, tubes or ovaries; and with remarkable success when we consider that it first struck the vital point of treating displaced organs. Alexander unwittingly used the same principle in drawing out the round ligament and with its covering of peritoneum which blended at the internal ring, shortening the anterior fold of the broad ligament just so much as there was of peritoneum passing through the internal ring. The operation was later spoiled by meddlers who pushed the peritoneum back off the ligament, as a result

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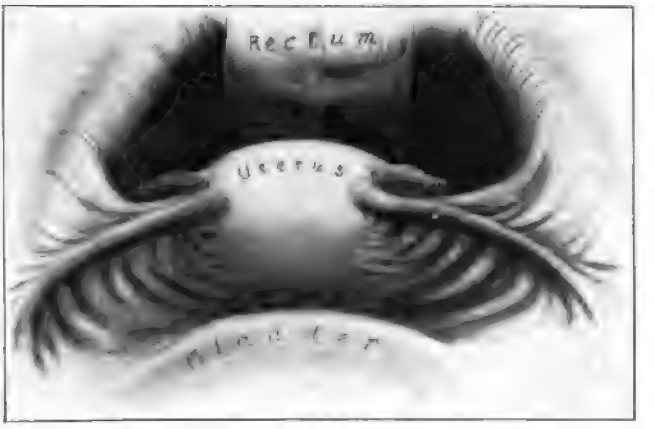

Fig. 1.--Relations in partial retrodisplacement of the uterus.

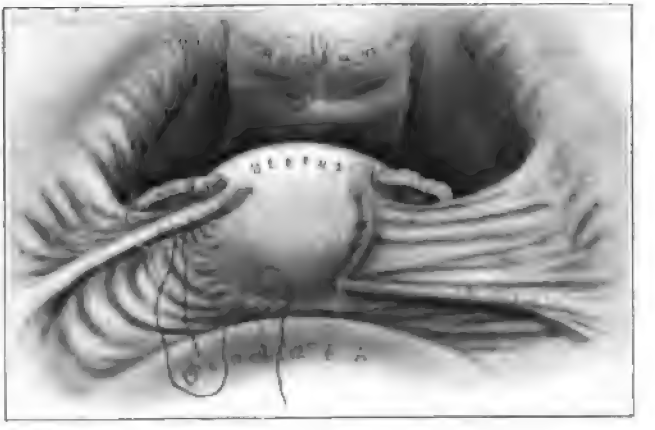

Fig. 2.--First step in author's round and broad ligament plication.

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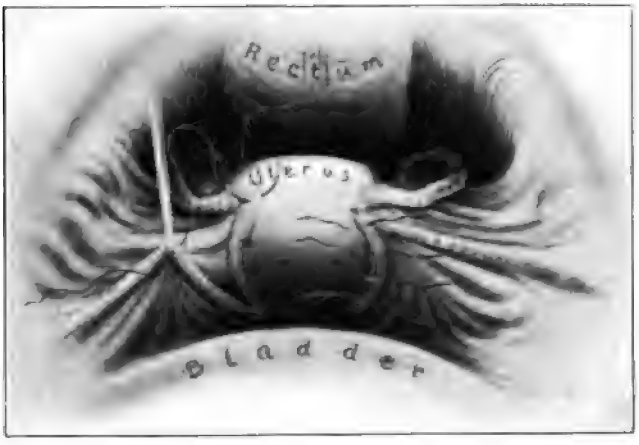

Fig. 3.—Second step in author's operation.

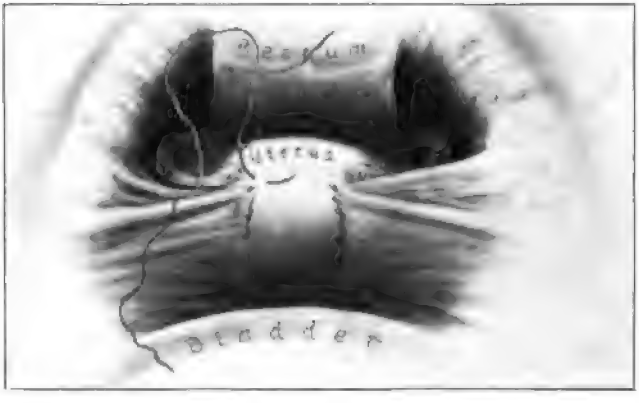

Fig. 4.—Third step in author's operation.

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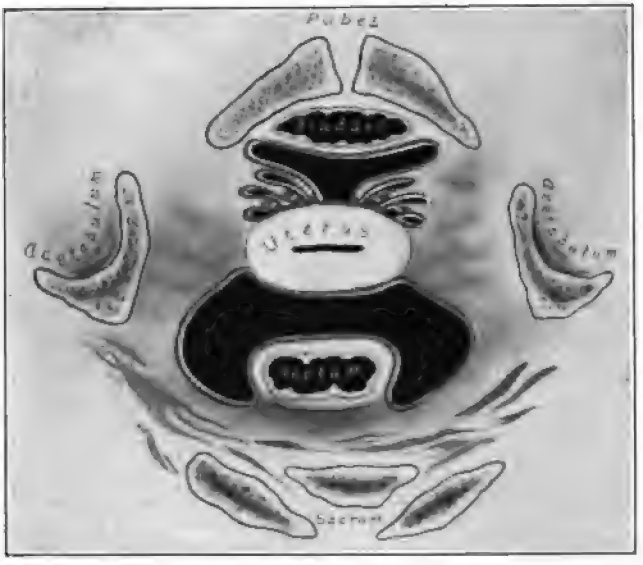

Fig. 5.—Sectional view, showing scheme of plication operation.

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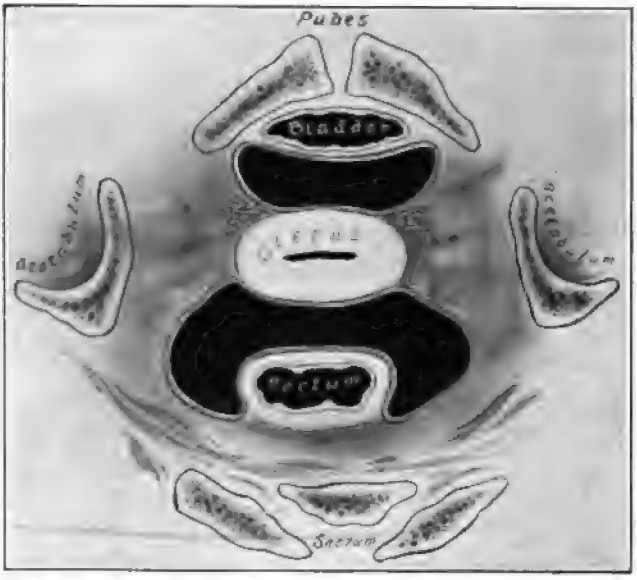

Fig. 6.—Sectional view, showing end-results of plication operation. Dotted lines represent obliterated peritoneal areas.

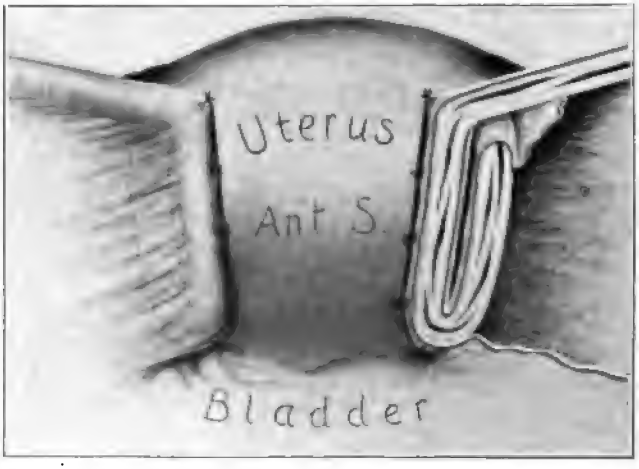

Fig. 7.—Second step of operation shown in perspective on the left and in sectional view on the right.

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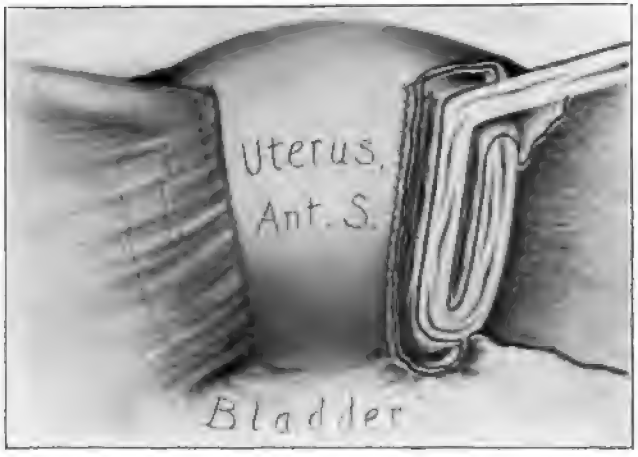

Fig. 8.—Third step shown in perspective on the left and sectional view on the right.

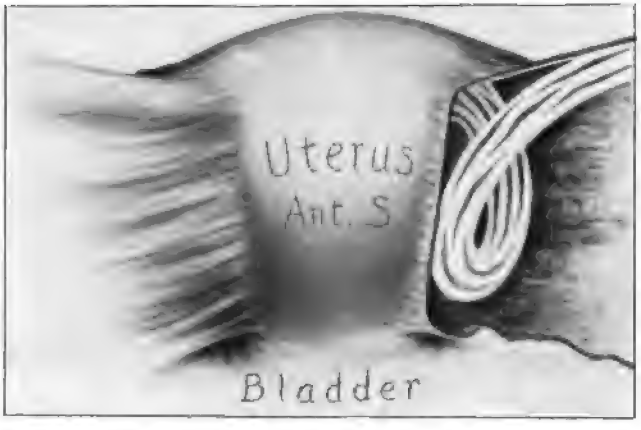

Fig. 9.—Round ligament freeing itself and straightening under the peritoneum.

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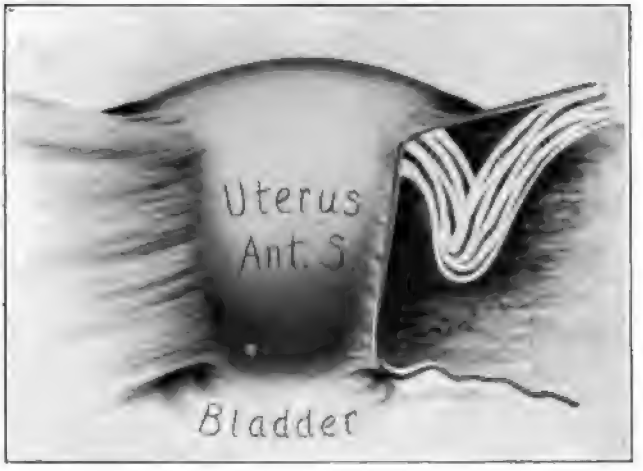

Fig. 10.—Final step; round ligament straightening itself under the peritoneum of the round ligament.

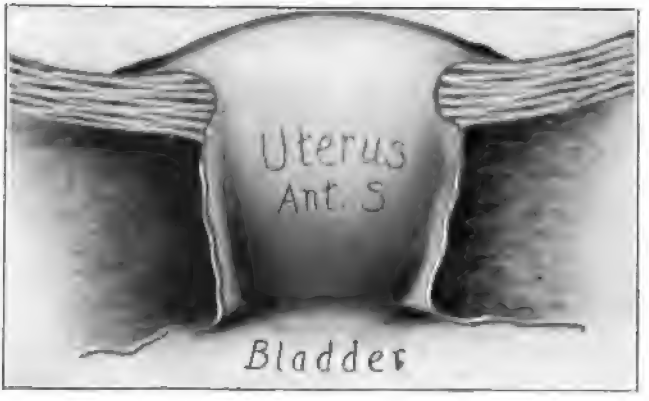

Fig. 11.—Round ligament restored to normal position under the peritoneum.

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of which the operation has fallen largely into disuse. The Gilliam, the Mann, the Simpson, the Baldy-Webster and all operations which are used to-day and have been found to be successful, use the peritoneum of the broad ligament; consequently the following rule has been formulated: "Two peritoneal surfaces brought together and held firmly in an aseptic state, adhere, blend, and obliterate and the contiguous surfaces lose their endothelial covering, becoming continuous at the point of peritoneal contact."

The uterus, however, differs from the other peritoneal organs in that it is much more moveable because of its functions; also, in that it is connected directly with the outside and therefore must be protected from extrusion. Because of the necessity for extraordinary mobility, the peritoneum of the broad ligament, the principal ligament, is attached extensively before and behind to the sides of the uterus and well down near its middle between fundus and cervix. Thus a very extensive attachment of peritoneum supports the uterus and gives it a wide range of mobility because of the large amount of loose connective tissue holding the peritoneum of the pelvis to its fixed walls. According to Nature's law of conservation, the uterus, which is so loosely attached, is turned in the pelvis in life, so that it lies practically crosswise. Owing to the fact that such a variety of positions must be assumed, it becomes necessary to have some other means of automatically or involuntarily poising this organ and keeping it in this position at right angles to the body. Therefore the round ligament becomes a necessity, and is, histologically, perfectly constructed for such a function, as indicated by the following definition, taken from Sobotta:

In addition to the broad ligament, the uterus possesses other ligaments which are to be regarded as a continuation of its musculature. The most important of these is the round ligament, which is essentially a cylindrical or slightly flattened muscular cord, 12 to 15 cm. in length, which takes origin

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on either side from the anterior surface of the uterus in the vicinity of the uterine extremity of the tubes, and runs at first almost horizontally, then forward and downward between the two layers of the broad ligament covered mainly by the anterior one. In the vicinity of the uterus the ligament is thickened and consists solely of connective tissue and non-striated muscle but in its course through the inguinal canal it usually receives fasciculi of striated fibers from the internal oblique and transversalis which are continued on it for a varying distance, frequently extending almost to the uterus but never passing externally beyond the inguinal ring. He further says: "Similar continuations of the uterine musculature are the recto-uterine which run in peritoneal folds of the same name and connect the superficial musculature of the rectum with that of the uterus. The uterosacral ligaments are connective-tissue fasciculi which accompany the muscular similarly named folds to the region of the second and third sacral vertebræ where they fuse with the peritoneum.

Taking up the physiology, we find that a muscle fiber has no other function than that of contraction and producing motion. We also know that a muscle fiber will under no circumstances stand a continuous strain, and that a muscle is therefore totally unfitted for taking up the work of a ligament proper; consequently, the only physiologic function for which the round ligament could be used would be for producing motion, aside from the function performed by the connective tissue, which is an extraordinary precaution to prevent the uterus from being extruded. It is therefore very evident that the function of the round ligament must be that of automatically poising the uterus during the various positions assumed by the individual and thus preventing it from becoming a dead weight on the broad ligament.

OPERATION

In the early operations of double salpingectomy and oophorectomy, in which the broad ligament was tied off en masse, and in which the round ligament was frequently included, a large percentage of the patients developed a retroversion. If one or both round ligaments are destroyed by traumatism, retroversion will

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frequently take place later on; therefore it seems that the round ligament and the broad ligament are equally essential to the proper holding of the uterus in position —the broad ligament to carry the constant weight; the round ligament to poise it on this support in a manner making it easy to carry. Such being the case, the ideal operation for retrodisplacement of the uterus should shorten the broad ligament and at the same time avoid permantly fixing and thereby hampering the movements of the round ligament. Therefore I submit the following operation:

Before beginning the operation proper, break up adhesions, treat adnexa, lifting the uterus, and pack a sponge back of it which leaves it in the position shown in (Fig. 1). Then sieze the round ligament about an inch and a half from the uterus, and with a No. 2 or No. 3 chromicized catgut, stitch to the anterolateral border of the uterus at the beginning of the vesico-uterine fold. Place three or four similar sutures between this point and the uterine end of the ligament (Fig. 2). Thus a double fold of the broad ligament is brought over to the side of the uterus.

Seize the ligament an inch and a half further on and bring it up to a point just above and internal to the uterine end of the round ligament and fasten with a chromicized catgut suture. Place three or four more sutures between this and the first suture at the vesico-uterine fold (Fig. 3). Thus, two more peritoneal or broad ligament layers are brought over to the side and front of the uterus.

With a No. 1 or 2 chromicized catgut continuous suture, bring a fold of peritoneum from each side over the line of interrupted chromicized sutures. This continuous suture may include as much of the peritoneum as necessary to bring it taut; care must be made to avoid pulling in the bladder. (Fig. 4). Be careful not to include the entire thickness of the round ligament in any of the rows of sutures.

I have personally performed 272 operations for retrodisplacements of the uterus by using this method. In twelve other cases continuous sutures were used all through, in an attempt to shorten the operation. After the twelve operations by the continuous method, four patients relapsed very soon and the other eight have not

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been heard from. After the 272 operations by the method described, using the interrupted sutures, I have heard of only two cases of recurrence; one after an operation for prolapsus in an old woman, another in which the operation was followed by volvulus, requiring a secondary operation and drainage. In fact, I have not examined these patients and do not know that recurrence has taken place. I have learned directly of eighteen women who have borne children since. In these, no dystocia has been noticed. I have personally examined four of the eighteen after labor and found the uterus in good position. The other fourteen have been examined by the family physician and the uterus has been found in good position. Of the 272 patients five have required a later operation for other diseased conditions in the lower abdomen, which has given an opportunity to observe the condition following the operation. In all five cases, the broad ligament was found holding the uterus in perfect position. The ligament was normal except that the anterior fold seemed slightly thicker. The round ligaments, one of which in all cases, and both of which, in some cases, had been attenuated to the size of a very small cord, had regained their normal size and their normal position under the peritoneum and, in fact, had reestablished relations that were normal in every respect. Therefore I feel justified in presenting Figures 7 to 11 to illustrate the manner in which the round ligament unquestionably restores itself to its normal condition. I may here state that this is easily proved by making a cloth uterus and broad ligaments in which a round ligament made of an elastic cord is placed. By folding the round ligament and the broad ligament on the surface of the cloth uterus, as I have done in the operation, taking care to glue the cloth broad ligament to the surface of the cloth uterus, thus corresponding to the blending of the peritoneum; by using sutures which can be either withdrawn or cut, in order to free the elastic cord, it will be found that the

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cord will slip out from between the layers of the cloth broad ligament, producing exactly the same condition I have found in my cases, minus the blending of the adjacent peritoneal surfaces which obliterate all peritoneal spaces.

Figure 7 shows the second step of the operation in perspective on one side and a sectional view of the same step of the operation on the other side. In the sectional view, representing the round ligament as being very much attenuated, the muscle cells are few.

Figure 8 shows the completed operation in perspective on one side and a sectional view of the completed operation on the other side with the same attenuated ligaments.

Figure 9 shows a broad ligament some weeks after operation on one side and on the other side, the theory of the gradual freeing of the round ligament under the broad ligament as represented. The round ligament has had time to rest, the catgut sutures have been partially absorbed, the muscle fibers, performing their normal function of contraction, are coming closer together, thereby straightening the ligament out under the peritoneum.

Figure 10 is an extension of the same process in which the round ligament is becoming straighter and the muscle fibers are becoming more numerous.

Figure 11 shows the round ligament straightened out under the broad ligament and the establishment of a normal cord:

In this operation, as proved by results seen afterward, all the requirements of the anatomic and surgical principles set forth have been fulfilled. The broad ligament, which is the principal support of the uterus, has been shortened, and the action of the round ligament has not been permanently hampered, so that while the uterus is supported constantly by the broad ligament, it may also be poised to suit the changing positions of the body.

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Dr. W. B. Holden, my office neighbor, has done this operation more than 50 times without recurrence as far as he knows, and states, in a personal communication that the results are so satisfying that he never thinks of doing any other operation for retroversion of the uterus.

Dr. Suttner of Walla Walla, Wash., has done the operation regularly for some time (more than 150 operations), and patients have been pleased with it. The observations of all these operators, taken with my own, seem to indicate that the comfort to the patient is greater in this operation than in any other operation having the same object. The absence of the backache, which is represented as following operations which permanently fix the round ligament, is a very noticeable feature. Previous to the development of this operation, I had done approximately 200 Kelley operations with very good success as far as holding is concerned. The anatomic condition left after the operation was unsatisfactory in a considerable number of cases. Labor was difficult in a proportion of the patients. In some cases habitual abortion occurred and a very large percentage of the patients complained of the old backaches, pulling on the abdomen, and a train of nervous symptoms which were even worse than the original. I may here state that I followed Suttner's lead in performing these operations in cases in which the uterus was already pregnant. Suttner deliberately did this operation in two cases in the second month of pregnancy in order to prevent abortion which had previously been habitual about the third month as a result of the displaced uterus. In both instances, the child went on to full term and was born without difficulty. In one of my cases the patient was pregnant at the time of operation but did not know it. She went on to full term and was delivered. In another case, the patient, an unmarried woman, was found to be pregnant

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two months. The plication operation was done regardless of the condition. The wedding ceremony was performed the night after the operation. Pregnancy went on to full term and the child is now several months old. I presume that these pregnancies would continue with any of the other round ligament operations in just the same way, but I mention these cases to show that while this operation seems to comprise a good deal of surgery the traumatism must necessarily be of a superficial nature.

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THE EVOLUTION OF THE SURGICAL TREATMENT OF RETRODEVIATIONS OF THE UTERUS

E. C. DUDLEY, M.D.
CHICAGO

I desire at the outset to enter a disclaimer, in that I believe that the surgical treatment of deviations of the uterus and associated pelvic organs is far from settled, so far that perhaps some of the hysteropexies, the ligament shortenings, the suspensions, the fixations, in their wide divergence may to the next generation look as crude and unscientific as the routine clamp and drainage-tube in ovariotomy now look to us. Perhaps we are a little too inclined prematurely to dogmatize on the subject—and especially the inventor of an operation is like the expert witness, who said: "Your honor, in matters of fact I am often mistaken, but in matters of opinion I know I am right."

The fine adjustment of the mere mechanical technic of any or all of the current operations is of less consequence than the selection of suitable cases and the recognition of the facts that surgical measures are not demanded for all retrodeviations; that there is no fixed normal position of the pelvic organs; that the matter is one rather of normal movements than of normal position; that the normal supports, so-called, are functionally concerned, not with holding the organ in some fixed position, but rather with restraining it within its normal range of movements; that a uterus out of place, if you please, may by a surgical procedure be put in

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place and so fixed that the fixation is more injurious, more embarrassing than the displacement.

Many would say, not without reason, that we all are prone to treat this subject from purely mechanical points of view and thus to lose sight of essential pathologic changes which have produced mechanical deviations, treating effect instead of cause, like damming up a river to prevent its waters from flowing into the ocean. But on the other hand we must not forget that if the resources of Nature have been exhausted in the production of the lesion we may have recourse sometimes to mechanical measures, irrespective that if an ideal anatomic and physiologic cure is impossible yet a symptomatic cure may be desirable.

Confining the discussion to the relative merits of those procedures which now have the support of progressive surgery we may classify them under two heads:

1. Operations which give sustaining power by means of peritoneal adhesions or fixation.

2. Operations which give sustaining power by shortening of ligaments.

In the interest of brevity we may disregard surgical operations of whatever class which are performed by vaginal section, not that we should condemn vaginal hysteropexy *in toto,* but that the field is relatively narrow, and the discussion therefore in this place in some degree unprofitable.

The different procedures, therefore, so far as I shall weigh them, narrow down to operations performed through the median or nearly median abdominal section.

Touching the class of operations which give sustaining power by seroserous adhesion or fixation, that is, ventral suspensions and ventral fixations, some will remember thirty years ago when it was a vexed question what to do with a retroverted uterus before closing the abdomen after a pelvic operation, such for example, as the removal of pus tubes. Sometimes cautiously and

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tentatively and with some misgivings, having a pioneer respect for the peritoneum, we united with a single stitch the fundus or the anterior wall of the corpus uteri to some point in the peritoneum near the pubes. In a few weeks examination usually disclosed the uterus agin retroverted and thereby demonstrated the inadequacy of this technic; then several sutures were used instead of one with the same result; then before suturing we scraped off with a sharp knife the peritoneal surface so as to give raw surfaces to be united and the result was strong broad cicatricial union and permanent fixation; in fact, immobilization of the uterus; then was written the tragic and humiliating chapter of mechanical fixation of the uterus, a chapter which told of obstruction of the bowel, dystocia, rupture of the parturient uterus and other obstetric calamities not to mention a formidable list of disabling, distressing consequences, neurotic and circulatory, local and general. Ventral fixation then relegated to the dark ages of surgery soon gave way to ventral suspension of the uterus by less barbarous methods—an operation popularized by Howard Kelly which in the final and successful evolution resulted quite uniformly in stable equilibrium of the uterus, and at the same time left it free in its normal range of movements. The principle was simple and effective; it was to unite to the anterior parietal peritoneum, not the fundus or the anterior wall of the corpus uteri but the posterior wall, and, what is most essential, to that part of the posterior wall just back of the fundus, a surface about one-half inch back of a line connecting the uterine ends of the Fallopian tubes. This surface was united to parietal peritoneum near the uterovesical reflexion. Stable equilibrium and permanent uniform results were secured by the simple change in the selection of surfaces to be united without denudation of the united surfaces and with two or three absorbable catgut sutures; that is, very light adhesions of these surfaces were sufficient. Moreover, this union, by lifting the posterior wall of the

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corpus against the parietal peritoneum, also served to tilt back the cervix so as to place it nearer to the hollow of the sacrum—a most essential mechanical factor in the correction of retroversion, for if the cervix be normally near the sacrum, the corpus does not have space in which to retrovert.

This operation, modified by myself in a personal experience of several hundred cases, was in a degree satisfactory both as a means of correcting the displacement and in its freedom from the distressing mechanical results which had discredited the obsolete operation of fixation. It, however, may give rise to obstruction of the bowel, for it always left a more or less constricted passage around the uterus, especially if the adhesions pull out into cicatricial bands under which intestine could work its way and be compressed. Such accidents, with grave results, have been reported from time to time. Moreover, the operation in incompetent hands, although intended to produce light adhesions only, sometimes sets up union so strong and cicatricial as to amount to the much-dreaded fixation already condemned. These things being so, I finally disregarded my own satisfactory results and those of others, and have almost abandoned the operation, and in place of it for several years have substituted one after another of the various ligament-shortening operations.

In taking leave of the suspension operation, which in the evolution of the subject has held so large a place, I pay it my very appreciative respects; it was a tried and trusted friend; it hardly ever failed; it never, in my personal experience, was followed by bad results which I could attribute to it: unfortunately, however, it is beset by the sentimental objection that it is not anatomic, and, under indictment therefore by the surgical purist is charged with the crime of being unsurgical. It may plead, however, extenuating circumstances, inasmuch as it has suffered from the evil relations and evil associa-

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tions of fixation, the sins of which, by confusion of the two operations, have been visited on it most unjustly. And so, reluctantly, not without some sense of disloyalty, I lay aside, temporarily at least, an old benefactor, and pass to the more approved ligament-shortening operations.

There is, perhaps, more scientific indication for shortening the uterosacral than for shortening the round ligaments because these ligaments should maintain the normal short distance between the cervix uteri and the hollow of the sacrum, and because shortening them therefore may fulfill an essential indication, but with due respect for contrary opinions no uterosacral operation, so far as I am aware, has been developed to the degree of satisfactory stable results; that is, the shortened uterosacral ligaments do not hold well. They are liable to pull out again soon after the shortening, causing the operation to fail.

The recent operation of Harris,[1] by which a new ligament is formed to supplant the uterosacrals by utilizing the long tendon of the psoas parvus muscle, is too new to permit an estimate of its value; it probably is destined, however, to go the winding way of artificial ligament operations.

Shortening of the broad ligaments is not germane to this discussion, except as it enters incidentally into the round ligament operations.

Perhaps we may drop the curtain on Alexander's operation now regarded as obsolete. The substitute operation once advocated by Goldspohn, while reasonably effective, I would discard as requiring an unnecessary amount of surgery for the accomplishment of the purpose, especially since this surgery might, in the hands of an unlucky surgeon, weaken the region of both inguinal canals and the abdominal rings and thus give rise to hernia, to say nothing of its increased danger of

1. Harris, M. L.: A New Operation for Prolapse of the Uterus, THE JOURNAL A. M. A., May 14, 1910, p. 1605.

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sepsis. The various operations of doubling the round ligaments on themselves or of suturing them in front of the uterus, although very useful in their time, now. in the face of more recent procedures, appear to be passing into disuse. They always were open to objection of frequent inadequacy for permanent results.

Perhaps without fear of much contradiction we may eliminate from serious discussion all ligament-shortening operations except those which belong to the most recent era, an era which began with the operation of Gilliam. This operation has been modified in technic by Barrett, myself, and others, and has been somewhat, though perhaps not very materially improved. In addition to the merit of being anatomic, and therefore surgical, it gives reasonably permanent results, although possibly not so permanent as the suspension operations of Kelly, already described, approved, and reluctantly laid aside. Gilliam, so far as I am aware, took the longest step toward placing the surgical treatment of retrodisplacements on a scientific basis. Just what form of this method of supporting the uterus by drawing the round ligaments through other structures and fastening them there will stand the final test of experience against all others, the future must decide. The operation is not quite adequate, however, inasmuch as it fails like all others of its kind to hold the cervix back in its normal location near the hollow of the sacrum, an essential requirement for perfection still unfilled by any method so far proposed.

A radical departure from the Gilliam technic, although not entirely different in principle, inasmuch as it passes the round ligament through other structures, is the operation of drawing the round ligaments through the broad ligaments and fastening them on the posterior wall of the corpus uteri. Clarence Webster, I think, first described this operation, and therefore is entitled to the credit of literary priority. I believe it was earlier performed by Frank Andrews. It has been successfully

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championed by Baldy. I have performed it more frequently than any other for several years, and so far as I have been able to observe results, am inclined to give it a great deal of preference. This and other round ligament operations are thought to be inadequate and therefore contraindicated when the ligaments are so attenuated as to be incapable of giving much support and in such cases many revert to the suspension operation by adhesion.

I think I would favor this operation even with an attenuated ligament inasmuch as it carries along with the ligaments considerable peritoneum, which becomes adherent and gives supporting power. In fact, the peritoneal element in posterior attachment is a most significant factor—almost as significant as it is in ventral suspension; it combines the advantages of ligament shortening with seroserous adhesions and is free from danger of resultant obstruction of the bowel so much feared in the ventral suspension and the original Gilliam operation.

The pessary recognized in former times as being of great value has fallen into unmerited disuse and the correct application of it has become almost a lost art.

One additional word: In this age of dramatic surgical achievement in the abdomen, let us remember that our fathers of the last generation developed plastic surgery on the vaginal side of the pelvic floor to a surpassing degree. Let us keep in sight the fact that any abdominal operation, for retroversion or descent, however well selected or performed, may be of little avail against the counter-influence of a relaxed pelvic outlet, and that good plastic work below therefore may be indispensible. Perhaps it is true that the pioneers did better plastic work that we are doing now. It would be interesting entirely if under the blinding influence of major surgery, plastic gynecology should become a lost art.

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ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. COFFEY, BALDY, GILLIAM, SIMPSON, DUDLEY AND GOLDSPOHN, FORMING A SYMPOSIUM ON OPERATIONS FOR RETROFLEXION OF THE UTERUS

DR. E. E. MONTGOMERY, Philadelphia: It is with considerable hesitation that I speak when the inventors have presented their various operative procedures. I class myself as an adjuster rather than an inventor. The number of operations that have been introduced for correcting and maintaining the uterus in its proper position is evidence that none of these has been exactly what was necessary in all cases, and I would not come to-day to advocate any particular operation as an absolutely sure cure in every case that might present itself. I have lived long enough in the profession to have gone through the various procedures that have been devised from time to time for this purpose. I have, of course, practiced the operation of ventrosuspension and ventrofixation. I had the misfortune in performing this latter operation in one case to have a knuckle of intestine slip around the band of adhesion and the patient die as the result of the constriction of the intestine. This accident led me in doing the Gilliam operation to obliterate the space on either side in which the intestines might slip through. Later I utilized the procedure of Dr. Simpson with that of Dr. Gilliam by making an opening in the anterior leaflet of the broad ligament, threading the ends of the ligature which have been passed around the round ligament into the eye of a Deschamp's needle and have carried this through the broad ligament until it has penetrated the aponeurosis as suggested by Gilliam. I much prefer the Pfannenstiel incision, as it permits of greater exposure of the parts. This procedure also enables us to get directly down on the site of the round ligament. We are directly over it and it is under our control during the whole procedure.

The operation suggested by Dr. Baldy certainly does lift up the uterus and probably sustains it better than any operation done on the round ligaments. The objections are the very extensive traumatism on the posterior surface of the uterus and the fact that it pulls out the ligaments from the peritoneum, leaving an extensive raw surface on the posterior surface of the ligament to which adhesions of the intestine and rectum are likely to occur. I have had the opportunity to operate on one of the patients who had passed through the hands of Dr. Baldy and found that this condition existed, drawing back the uterus after an operation had been done. This modification makes a fibrous band of the musculature which is effectual in maintaining the uterus in a forward position. The uterosacral ligaments are much like the Arctic circle—an imaginary line. They have been completely obliterated by the conditions which have led to the sinking down of the uterus and are consequently of little effect. The pro-

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cedure suggested by Coffey of utilizing the peritoneum, bringing about extensive adhesions of the peritoneum, serves a most efficient purpose. Here the uterus is held up by adhesions and consequently the cervix drawn backward and upward and in that way the displacement is overcome.

DR. J. B. MURPHY, Chicago: I address you in this discussion as fellow gynecologists, because it is all surgical, and all of the gynecologists are going to become general surgeons. In the question of retrodisplacement we have important problems. The position in which the uterus arrives at the physician's office is in one of the two, three or four degrees of displacement into which we usually subdivide them. Those who have lived through the pessary period and know the great relief that the patient receives when the uterus is held forward with a pessary, put in intelligently, know the relief that can be obtained from replacement, when you do not do additional damage to the patient by its improper insertion. I say that after a considerable clinical experience. In the attempt to relieve the displacement by many of the operations, and in some of the patients by all of the operations, the treatment leaves the patient worse than when it was begun. Just why this is true we do not know, but we know it occurs. Therefore, in deciding on the operation we must individualize as to anatomic conditions present, taking note of the degree of displacement, the construction of the patient's pelvis, and of the supports which we are able to appropriate for the retention of the uterus.

In the relief of displacements by anterior fixation to the abdominal wall, which I was supposed to discuss, I must say this, that I made the ventral fixation for a number of years in the majority of operations. In a considerable percentage of cases the patients had three causes of complaint against me: (1) When the patient sneezed she had to grab her abdomen because of the pain caused by the traction; (2) when she jumped from a street car or carriage there was a sensation of tension or of pain; (3) finally, elongation took place and the uterus returned to the previous position. In the evolution of the displacement, whether it is immediate, following a severe injury or strain, or whether it is gradual, where do you find the uterus in the third degree? Down in Douglas' pouch with the intra-abdominal pressure on the anterior wall. Where are your round ligaments running? If you examine the patients, and particularly the thin ones, you will find in the superlative degree of displacement, if you are going to appropriate the round ligament to the support of the uterus without changing its attachment, that you have another element to contend with—the round ligament, normally situated high up and near the corner of the uterus, has worked down one and a half inches to the line. So that you have lost your leverage support from its position. The round ligament, I

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consider, is the balancing cord of the uterus. It carries none of its weight, simply balances it, and the weight is carried from below. The most natural thing in its restoration would be to put the weight where it was before; but the weight remains, except that it is resting on the floor of Douglas' pouch.

I use the round ligament for restoration in cases in which there is a comparative degree of displacement. Recurrence is more frequent than agreeable, but I believe there is less discomfort to the patient than with the fixation. In the superlative degree of displacement I have followed another line of treatment. In a case of procidentia if you will make an incision in the Pfannenstiel line down to the rectus muscle, then split the rectus muscle in a line parallel to its long axis; draw out the uterus and cut off the round and broad ligaments down to the cervico-corporeal junction, then split the uterus parallel to the long axis of the body down to the cervix, turn out the lateral flaps, remove the mucosa of the tube and uterus down to the cervix, then sew the uterus to the external surface of the sheath of the recti after uniting the peritoneum and the aponeurosis of the rectus up around the cervico-corporeal margin of the uterus, it will then hold the bladder and the rectum up as long as the patient lives.

Dr. H. J. Boldt, New York: We have traveled through a veritable jungle of surgical interventions for the cure of displacements of the uterus, particularly posterior displacement. We might believe—judging entirely from what has been said, with the exception of the last speaker, Dr. Murphy, who paid attention to other than surgical intervention—that perhaps there is no other method than surgical intervention. Moreover, judging from the number of operations which have been reported, off and on, for displacement of the uterus, it would seem that every woman who has a retrodisplacement of the uterus must have been subjected to a surgical intervention for the relief of that displacement. We must bear in mind that so far as the symptoms are concerned, caused by a posterior displacement, they very seldom are caused, except from a mechanical interference with the functions of the pelvic organs. Symptoms are usually caused by complications. When symptoms occur from a mechanical cause we need not at once resort to the opening of the abdomen. In that class of cases I believe the great number of patients can be treated effectually by the use of a pessary, applied with common sense. There are a few isolated cases in which a pessary will not relieve such conditions. In cases in which the fundus of the uterus tips over the upper part of the pessary, and in that class of cases alone, we should consider the desirability of surgical intervention. I believe, notwithstanding what has been said, that the ideal operation is the Adams-Alexander operation, through the inguinal canal, provided that there is

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no downward displacement. The moment we have descensus the operation is absolutely worthless. So far as intraperitoneal operations are concerned, they are indicated only in the presence of complications with the adnexa, when we have an adherent retroflexion.

All the argument, all the speaking done here, will have no effect on any of the men who have devised operations. The matter is one of personal equation. I believe there are merits in all. There are so many roads that lead to Rome we may have the benefit of any. My personal experience has led me to believe that the operation devised by Dr. Gilliam is the most satisfactory.

Dr. J. H. Carstens, Detroit: It seems to me that Dr. Boldt has struck the keynote. When I was a young man I had a patient with retroversion. I had been graduated at a period when there was a great cry against pessaries. So, of course, I did not use a pessary—thought they were injurious—and I treated the woman on general principles. She evidently was a great sufferer. She ceased coming to my office and the next thing I heard was that she had gone to a woman physician who had examined her and said she had a retroflexed uterus. She put in a pessary and cured her. I have found since then, as Dr. Boldt has said, that there are cases in which pessaries are valuable; for instance, in those cases shortly after confinement in which the uterus is large and heavy. Other cases are those of young girls and sometimes of married women. It occurs to me that if there are adhesions and you have to open the cul-de-sac, you might as well open it anteriorly and find out what is necessary to do rather than to perform the Alexander operation. The patients who require only pessary treatment and who have simple retroversions that produce no symptoms I do not see. The kind of cases we see are complicated cases in which we must do exploratory abdominal section. In one case I may take out a tube and ovary. In many of these cases I sew the stump in the lower abdominal incision, and even in patients subsequently pregnant no trouble has been experienced. In some of these cases I do an operation such as Dr. Bandler does. Sometimes one is good; sometimes another.

Dr. C. W. Barrett, Chicago: Fellow surgeons—I say that because a great gynecologist is something of a special surgeon, and not because every surgeon is a great gynecologist—we have had a great feast showing what the round ligaments and the false ligaments can do in the correction of retrodisplacement. If I remember aright there was another great feast at which there appeared certain handwriting on the wall, which translated, I believe, meant. "Weighed in the balance and found wanting." That applies to a number of the operations spoken of here for retrodisplacement. The soundest principles have been laid down by Dr. Goldspohn. His is the operation

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of safety. Ventrosuspension and ventrofixation were formerly the excuses you could offer the patient for making a vivisection, for studying anatomy and living pathology, and they have had a wonderful place, but they are dead operations. The satisfaction that each person has felt in an operative procedure only shows how easily we are satisfied, and this is the chief thing in the way of progress. We must have the very best thing that can be offered, for the best is none too good. Whatever operation we choose must follow certain definite principles. It must be not complicated. It must be safe, immediately and remotely safe. It must allow inspection and correction of conditions in the abdomen. Next, it must use normal ligaments instead of false ligaments. Goldspohn has laid this down definitely. It must have the best part of a ligament instead of the poorest part, because there is a better and a poorer part of the round ligament. Next, it must use the natural ligaments and place them normally. It must not sew up the round ligaments and run them anywhere. I do not condemn Dr. Gilliam for proposing that, but it is an evil of ventrosuspension that it runs ligaments from the peritoneal space. An operation to stand the test must meet these requirements. Such an operation will stand the double test of pregnancy. I thought at one time that I had devised such an operation. I had full possession of that thought for two years. Then I had to share the matter with Charles Mayo. In another year I think I shall have no connection with it at all.

Dr. H. O. Marcy, Boston: Many years ago I thought I knew something of this operation. I had studied hernia with a great deal of care; therefore I thought I knew all about the Alexander operation. I welcomed it. I did it. I thought I knew my anatomy. I failed. I discredited it. To-day I take the position largely of Dr. Montgomery. We must be guided by the different factors. First of all, if we can restore a patient by a well adjusted pessary, it is *prima facie* evidence that operations from below may cure. When they fail it must be, I think, an operation from above. That operation, several men have said, must be laparotomy, and that gives you the inspection as Dr. Carstens has said and the knowledge of the various factors with which one must deal. Then, after doing all sorts of operations on the ligaments, in a general way, I have operated for quite a number of years—transplanting the round ligaments a little higher, making a new inguinal canal, reproduced to the normal pattern—for it is a congenital defect. The peritoneum must be so infolded that raw surfaces are not left within the abdominal cavity.

Dr. W. H. Wathen, Louisville: If once a surgeon begins to treat these patients each on the same principle he will never be successful. Each patient must be treated as an individual case and the existing pathologic conditions must

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be met. You hear a great deal said about shortening the round ligaments, the utero-sacral ligaments, and the various structures, to hold the uterus in position. It has never yet been demonstrated what does normally hold the uterus in place. We do know that there are structures above the perineal floor and there are structures below the uterus that participate in this, and whenever you find a defect in the structures you must treat such defect as encountered. I have performed nearly all the operations discussed to-day because in my line of work I have had a relatively large experience, and I have found less trouble and better results by anterior suspension. I have had no trouble following pregnancy. As Dr. Dudley has remarked, if in a case of retrodisplacement you perform any or all of the operations for the cure, yet do not repair the pelvic floor and suspend or elevate the bladder, you will never secure permanent success. If you make an anterior suspension in women not past the childbearing period by one suture only, and then build up the pelvic floor and bladder wall you will have success. If the woman is past the child-bearing period, then make a firm anterior fixation instead of a suspension, and if the uterus is too large amputate a large portion of the cervix, unite the vagina to the stump of the cervix and at the same time repair the pelvic floor, and, if needed, separate the anterior wall of the vagina from the bladder, elevate it by an approved method and then do a uterine suspension or fixation as indicated by the age condition of the patient.

I often perform the Gilliam operation, or some of its modifications, but I have never had any complication following anterior suspension of the uterus and I have performed the operation several hundred times.

Dr. G. Betton Massey, Philadelphia: I wish to emphasize the true cause of the displacement, which seems to have been overlooked by those who have spoken. The pathologic condition is not the displacement; it is the morbid condition of the uterus, the chronic inflammation of the uterus. Proof of that is found in the very large number of retroflexions that present no symptoms. This is shown also by the fact that many such patients in whom the diseased condition of the uterus has been cured, without complete rectification of the flexion, cease to have symptoms. With an experience of twenty odd years in the treatment of these cases of retroflexion I have never yet come across a single patient in whom the normal movable condition of the uterus needed to be destroyed by a fixation. I protest against all the operations described, and consider each and every one based on a misconception of the pathologic condition. It is now universally conceded that inflammation is due to germs and not to mechanical conditions.

Dr. George Gellhorn, St. Louis: The multiplicity of these operations forces me to the conclusion that none of them is

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ideal and applicable in all cases. But how is the gynecologist who has not had the originality to invent a method of his own, or who has not enough material to test all these methods, to choose the one he shall use in the individual case? Granted that all the claims made for the various methods are justified, namely, that they do not interfere with the functions of the genital organs, and that they are not any more dangerous than the disease itself, I think there are certain principles, the consideration of which will help us to limit the methods from which we may choose. In a case of retroflexion during the reproductive age I would avoid, first, any operation which fixes the uterus in an abnormal position. Examples of such are ventrofixation and ventrosuspension. Second, I would avoid any operation which deprives me of the sense of sight. There is no living man who is able to determine by bimanual examination in every case before the operation the absence of delicate adhesions or of minor pathologic complications about the tubes and ovaries, and if he does an operation of the Alexander or Goldspohn types, he deprives himself of the opportunity of freeing adhesions. Third, in an operation, as Dr. Barrett has pointed out, in which the round ligaments are used, I would try to use the better part of these ligaments. In some of these operations the weak part is still left to do the work of holding up the uterus. Fourth, I would avoid any operation which utilizes ligaments which have a very unimportant part in holding the uterus in place, and which are much too weak to do it. These are the objections to the Bovée type of operation, in which the utero-sacral ligaments are utilized. They are much too small to hold the uterus forward ordinarily, and if we find in a patient thickened and shortened utero-sacral ligaments we have to treat that condition because it produces distressing symptoms. In methods of this kind we produce artificially a condition which we are often called on to treat. The observation of these four principles will help us to limit our choice and I believe that of the numerous methods, only part of which have been mentioned here, there will be hardly more than two or three that will answer.

Dr. Henry T. Byford, Chicago: The strong end of the round ligament is in the inguinal canal. Those who have performed the Alexander operation, know that they have to cut some fascial attachments in the inguinal canal which give firmer support than the intraperitoneal muscular part, which is not a direct support; it is a balancer. If we want to suspend the uterus we had better eliminate the intraperitoneal, muscular portion, and depend on the other. This is what is done in the Baldy operation. In the majority of cases we do not want actually to suspend the uterus, we merely want a balancing action. Nature has experimented on woman for many years and knows how to hold up the uterus. Those

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operations which imitate Nature by making use of a new canal, or the old one, must be right in principle.

DR. J. M. BALDY, Philadelphia: I feel a bit concerned that a general surgeon should speak of taking us in. For a considerable time the gynecologists have been attempting to educate the general surgeons, but having so ignominiously failed I feel that probably we had better go to them and learn general surgery, as suggested by Dr. Murphy. The pessary was not discussed in my paper because I was not asked to discuss that subject. I see pessaries used in only two kinds of cases, and I can come to but one conclusion—that nobody in the East knows how to use them—for it has been said on the floor that there are good ways of employing them. The two classes of patients who come to me with pessaries are those with perfectly normal anteriorly displaced uteri which need nothing and the patients have been made sick because some fool doctor has put a pessary in, and secondly, the patients with prolapse in which a pessary is of no use. Consequently I feel that nobody in the East knows how to use them, barring New York, and I intend to make a special trip to New York to see whether they are correctly used there. The ability seems to be confined to the West or to the Middle West, to Chicago principally. The evils of a procedure that any one has ever tried are always exhibited when we come to a discussion of technic. I shall not bore the Section with a discussion of the weak end of the round ligament, because I showed by the model this morning how useless is that portion of the round ligament in this operation. But I am going to lunch with Dr. Gellhorn and I shall convince him of his wrong position by showing him by the model that that end of the ligament is not used at all in the operation.

DR. D. TOD GILLIAM, Columbus, O.: The only criticism made of the operation which I have devised is that it leaves bands in the peritoneal cavity which are liable to produce obstruction of the bowels. "The proof of the pudding is the eating thereof." For ten long years or more this operation has been performed thousands of times by hundreds of different operators and there has never been a case of obstruction of the bowels.

DR. F. F. SIMPSON, Pittsburg: I think we all recognize the fact that there are many displacements of the uterus that require no treatment and that many others are corrected by the pessary. There are many others in which some coincident disease, cardiac, renal, pulmonary, thyroid or other disease, contraindicates any type of operation for any purpose. In such cases benefit is obtained from the use of the pessary. The work of Drs. Reynolds, Goldthwaite and others has shown the importance of examination of the sacroiliac joint before the treatment of displacement by any method is to be considered. In reference to the employment of other operations

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than those devised by the individual operator, I have used and am constantly using parts of operations of different types and expect to continue to do so.

Dr. A. Goldspohn, Chicago: Dr. Coffey makes several assumptions that are fundamentally wrong: (1) He assumes that all abdominal as well as pelvic organs are held in their places chiefly by their peritoneal mesenteric supports. The truth is that the abdominal walls hold the abdominal organs chiefly, as we soon find out when these walls are defective. On the other hand, the uterine supports have either connective tissue or muscle in them in addition to the peritoneum. The free expansion of pelvic tumors shows that peritoneum holds not much better than skin. (2) That two layers of stomach or intestinal wall may unite and form one layer permanently, does not prove that the same will be true of the broad and round ligaments about the uterus, which are subject to the phenomenal and entirely peculiar changes incident to gestation and parturition, which does not apply to intestines, etc. In secondary laparotomies I have repeatedly seen all such plications and foldings of broad and round ligaments completely wiped out without leaving a trace of the former work, after an intervening childbirth. In retroversion cases, the displacement had nearly always recurred. That the proposed plications of broad ligaments proposed by Dr. Coffey do give way as above stated, is shown by his declaration that the involved round ligaments disentangle themselves later, and assume their usual course. This they could not do without the giving way of the broad ligament plications. The doctor practically constructs two connected links of a chain, and then claims that they become separated without either one of them being broken. The operations devised by Drs. Webster, Baldy, Ries and a number of others for retroversion, are inferior as to stability, because they depend on the tapering, feeble outer ends of the round ligaments to do holding, which they cannot do because of their feebleness and because of their course in areolar tissue extraperitoneally before entering the inguinal canals. I have practiced, for some years past, median section with removal of the appendix and other explorations, and have corrected retroversions in a small number of cases by shortening the sacro-uterine ligaments; in others by transplantation of the round ligaments into the abdominal walls, by several of the different methods, chiefly by a modified Gilliam operation, in which the uterus is drawn up more, so that it comes in contact with the abdominal wall, and the utero-vesical space becomes quite effectively shut off from the entrance of the small intestine. The theoretical arguments about intestinal strangulation, etc., do not apply to this form of the operation at least, of which I have over 500 that are fully two years old, and without any such disaster, or any difficulty in child-birth occurring.

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ENTEROPTOSIS, WITH SPECIAL REFERENCE TO ITS ETIOLOGY AND DEVELOPMENT

AND REMARKS ON THE RESULTS OF EXAMINATION OF FOUR HUNDRED WOMEN WITH REFERENCE TO THIS CONDITION *

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The literature dealing with enteroptosis is a most voluminous one and I shall attempt nothing but a brief review of it. The subject is so unusually complex and presents so many different phases that it has led to much theoretical discussion, much of which has proven to be of little value. Our real advance and the best papers have come from those who have based their opinions on actual observations.

To Glénard,[1] who in 1885 published his paper which to-day is a classic, belongs the credit of calling the attention of the profession to the existence of this condition. Glénard believed that the whole trouble came from a sinking of the hepatic flexure of the colon. From this conception he built a most elaborate theory, which we know to-day has but little on which to stand. Glénard, however, recognized the type of individual in which enteroptosis was found and his description of it remains a classical one.

For five years after this the discussion remained confined to the French literature. In 1890, however,

1. Glénard: Application de la méthode naturelle à l'analyse de la dyspepsie nerveuse: détermination d'une espèce, Lyon méd., 1885, xlviii, 492.

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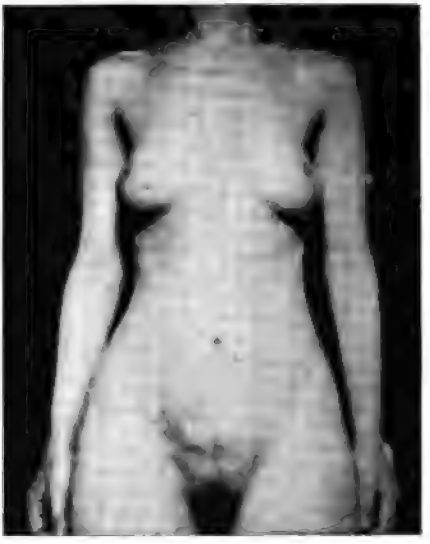

Fig. 1.—Typical enteroptotic figure. Fairly well-nourished. Muscular sufficiency poor. Thorax depth 17 cm., width 17.5 (!), index 94.5 (!), height 153 cm. (5 ft.), weight 94 lbs. Right kidney palpable; lower pole of stomach below umbilicus (gas). Pain in right side, well-marked neurasthenia. Note small size of thorax as compared with pelvis; small, long waist.

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Fig. 2.—Enteroptotic figure of very marked degree. Marked ill nutrition; marked muscular insufficiency. Thorax depth 13 cm. (!), waist breadth 20 cm., index 97 (!), height 147½ cm. (4 ft., 10 in.), weight 74 lbs. Palpable right kidney, lower pole of stomach in pelvis and very marked prolapse of colon (æ-ray). Marked digestive disturbance, extreme and apparently hopeless neurasthenia. Note slenderness of form, extremely poor nutrition, marked lack of lumbar lordosis, rounding of shoulders (but fairly sufficient anterior abdominal walls), also smallness and collapse of chest, downward slant of lower ribs and long neck.

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Ewald,[2] in a thoughtful and conservative article, brought the matter before the German profession. He gave Glénard credit for his discovery, but criticized many of his conclusions.

Stiller,[3] in 1896, pointed out the hereditary character of the condition and elaborated his floating tenth rib idea, which is often cited to-day. The profession has not verified the close association which Stiller seems to have found between enteroptosis and a floating tenth rib, but is inclined to look on it as an anomaly often occurring, to be sure, in the habitus enteroptoticus, but as well in other individuals and of too uncertain a connection to place much stress on. Stiller's two articles, however, reflect a most careful study and observation, and his work will always stand preeminent in the history of enteroptosis.

Perhaps the next most notable piece of work done was that of Mathes,[4] who, although particularly interested in the mechanical conditions leading to prolapse, gives a most excellent description of the habitus enteroptoticus and the body form and calls particular attention to the general nature of the trouble. Mathes' article is also based on four years of study and observation and marks a distinct advance in the study.

An article by Albu[5] last year repeats and endorses much of what Mathes has said and is an excellent and useful piece of work. Albu has apparently fallen into error, however, when he concludes that because the kidneys and livers of a large number of new-born infants are palpable, the visceral prolapse itself is congenital and exists from childhood up. To this Butler, in a

2. Ewald, C. A.: Ueber Enteroptose und Wanderniere, Berl. klin., Wchnschr., 1890, xxvi, 277, 304.

3. Stiller, B.: Ueber Enteroptose im Lichte eines neuen Stigma Neurasthenicum, Arch. f. Verdauungskr., 1896, ii, 285; Die Lehre von der Enteroptose und Nervösen Dyspepsie auf Grund des Costalstigmas, Berl. klin. Wchnschr., 1899, xxxvi, 742.

4. Mathes, P.: Ueber Enteroptose, nebst Bemerkungen über die Druckverhältnisse im Abdomen, Arch. f. Gynäk., 1906, lxxvii, No. 2, 357.

5. Albu: Die Bewertung der Visceralptose als Konstitutionsanomalie, Berl. klin. Wchnschr., 1909, xlvi, 289.

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paper based on a study of 155 children, has called attention.

An article by Martin,[6] of Chicago, and one by Vietor[7] are well worthy of citation, since they reflect a belief that the condition points to an arrest in the development of the embryo or a reversion to a lower type.

My own interest in the subject began some five years ago and was considerably stimulated by Mathes' article. I began examining, as a matter of routine, whenever practicable, the women who came to me. Most, but not all of them, presented symptoms referable to the pelvis or abdomen. I have examined formally over 400 such women and casually many more. After the usual pelvic and abdominal examinations, the weight, height, amount and condition of adipose and muscular tissue were noted and the form of the thorax and abdomen. I then obtained the index of Becher and Lenhoff and sought to palpate the kidneys. In the standing position, the form of the trunk, back and abdomen were observed and with the pelvimeter the depth of the chest at the end of the sternum and the width at the waist line were measured. I noted also the epigastric angle and the downward slant of the lower ribs. Lastly, the stomach was dilated and, in a prone position, its lower border, as obtained by this method, was recorded. In a considerable number photographs were obtained or other special examinations made. The mass of figures obtained became long since rather unwieldy and of but moderate value for statistical purposes. The study, however, has been a most interesting one and has yielded much that has been of value to me. Above all, it has served to give more accurate information as to the relationship existing between the various phenomena presented by the condition under discussion. In many phases of the matter,

6. Martin, F. H.: Visceral Prolapse: Some New Points in Etiology, Surg., Gynec. and Obst., 1908, vii, 638.

7. Vietor, Agnes C.: Introduction to the Study of the Fundamental Cause of Splanchnoptosis—Abdominal Incompetence; A Developmental Factor, Boston Med. and Surg. Jour., 1906, clv, 139.

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as in those that have been the special subject of this inquiry, I realize there is still much hard work to be done. The problems presented are most intricate, and I believe that little real advance will ever be made in them by theorizing or speculation.

The *x*-ray played a considerable part in my earlier study. With Dr. Henry Hulst,[8] under the bismuth meal and the *x*-ray method, I studied some forty or fifty women; and, although perhaps this feature of the work was not exhaustive, it served to establish definitely the relationship of body form to the prolapse of the viscera and to revolutionize our ideas as to the position and form of the stomach and intestines. In an earlier publication[9] are given the results of the *x*-ray examinations we had made up to that time and I have not materially changed my ideas since then.

From early observations I soon learned that the two terms "congenital" and "acquired," as belonging to the two supposed types of enteroptosis, were far from satisfying: the one varies from the other not only in the matter of etiology but in many other of its manifestations. The division, I believe, is apt to convey a wrong impression. I wish to discuss the acquired form briefly a little later and in its place, but for the present and for clearness it would seem best that it be put aside and that we deal simply with the true or essential condition.

It may be well first to give a brief description of the enteroptotic woman (Figs. 1, 2, 3, 4). The first impression one gets of such a woman is that of frailness, expressed in the contour of her form and often in her features. She is slender and has but little adipose tissue; her form is angular; her muscles are thin; there is almost invariably a perceptible laxness and

8. Hulst, H.: Skiagraphy of the Stomach and Intestines, Phys. and Surg., September, 1905; Röntgenography in Diseases of the Stomach and Intestines, Arch. Physiol. Therapy, January, 1906.

9. Smith, R. R.: Enteroptosis, with Special Reference to the Body Form: The Mechanical Conditions Governing the Abdominal Organs and the Use of the *X*-ray in Demonstrating Stomach and Intestines, Surg., Gynec. and Obst., 1906, iii, 130 (discussion).

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softness of her tissues. She impresses one as being underdeveloped and lacking in vigor. These may be designated as fundamental characteristics. Associated with and largely dependent on these characteristics, one notes in such an individual that the neck is long, the chest undersized and showing distinct signs of collapse; that is, it is shallow, the upper ribs far apart, the lower ones slanting downward and inward and lying close together, and there is a distinct lessening of the capacity of the thoracic abdomen. The abdominal muscles are soft and lack resistance (muscular insufficiency) and there is a tendency for them to bulge forward. This bulging is rarely present to any marked extent in the nullipara, and in a large number of cases it is practically lacking altogether. In the parous woman it is oftener present.*

The changes in the chest and upper abdomen above noted take place, largely at least, during the growth of the child to maturity—they are the permanent changes; at least, they are the most difficult of any material correction. These women are peculiarly apt to suffer from muscular insufficiency. We see it very apparent in the lessening of the lumbar lordosis, in the rounding back, the forward droop of the shoulders and, not infrequently, in weak-foot. The last-named important changes in body configuration, due to muscular insufficiencies, are by no means always conspicuously present and are to be looked on, generally speaking, as signs of fatigue. They are less permanent in character and are frequently materially bettered as the woman improves in health. I have not been able to note any marked difference in the height of these women, although Mathes speaks of them as undersized and Albu as taller than others. One sees them short or tall, as are the more vigorous ones. In weight they are decidedly lacking.

* The popular close association between enteroptosis and the size of the abdomen must be somewhat modified. The most marked prolapse often occurs in an abdomen that is nearly flat, and a bulging abdomen often encloses organs fairly well in place.

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owing to the want of adipose tissue and the slenderness of other body structures.

In forming an estimate of the degree of body abnormality, I have laid some little dependence on the depth of the thorax (measured with pelvimeter from lower end of sternum directly to back). In doing so the height of the individual must always be taken into consideration. The depth ran from 13 to 17 cm. in enteroptotic women and from 16 to 20 cm. in the more vigorous ones. The relative capacity of the upper abdomen was obtained by securing the measurement above mentioned and combining it with the width of the waist. The index of Becher and Lenhoff, obtained by dividing the jugulo-pubic distance by the circumference of the waist and multiplying the result by 100, is also of much value in making this estimate. The higher the index the smaller the capacity of the thoracic abdomen and *vice versa*. The size and form of the thorax and abdomen as seen and estimated externally will indicate closely the position of the abdominal viscera. One should note also the amount of adipose tissue in and about the abdomen, the condition of the body musculature and the retentive powers of the anterior abdominal wall. With these noted and with a little experience one may determine very closely the position of the viscera as a whole. One will find the prolapse of this or that organ sometimes varying considerably in relation to that of others, and he must not expect to make such estimates with mathematical exactness, but it is nevertheless true that the position of the viscera, as determined by palpation, percussion or the *x*-ray, corresponds very closely indeed to the outward signs above noted. The downward slant of the lower ribs and the epigastric angle (formed by the edge of the ribs, its apex being the lower end of the sterum) are useful and convenient signs in determining

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the collapse of the thorax and the size of the upper abdomen.†

In making a general estimate of the individual, however, relative to the enteroptotic habit, no one sign or condition should be entirely relied upon. It is practical to consider the amount of adipose tissue present, the condition of the musculature, the size and depth of the thorax, the size of the thoracic abdomen, the position of the viscera and perhaps, above all, the stability of the nervous system and any signs of its failure in normal function.

In speaking of enteroptosis one must distinguish clearly between the physical condition and the symptoms which the enteroptotic woman frequently develops. It must be recognized definitely that enteroptosis and good health, as we ordinarily speak of it, are not necessarily incompatible. We see constantly about us women of the most marked type who are in excellent health in the usual meaning of the term. They feel well, are free of pain and are able to take their places in society. As a class, however, they show less resistance to the strains of life than more vigorous women. Overwork, care and responsibility, indoor living, frequent child-bearing and poor food all bring enteroptotic women quickly to a state of fatigue, a lowered state of nutrition and an abnormal

† As to the mechanical conditions producing prolapse, we note in such women certain conditions present: First, the lack of fat, which diminishes the volume of the abdominal contents and changes the contour of its cavity; second, the marked diminution in the size of the thoracic abdomen; and third, a laxness or hypotonus of the tissues of all the abdominal walls. The diminution in the size of the upper abdomen seems unquestionably due to a lack of usual strength or tone in the semirigid walls—call it muscular insufficiency if you will. The diminution in size becomes in turn a factor in the visceral prolapse. I may not here discuss the individual organs; suffice it to say the prolapse of each is evidently modified by the strength and mechanism of the structures which limit its motion. They are variously affected by the conditions named above. This matter of the mechanical cause is one about which there has been a great deal of speculation and little exact experiment or observation and I hesitate to enter into it. The factors I have mentioned seem to me, after a considerable study of the subject, those primarily concerned when considering mechanical causes and which I think must be fully considered in any argument on this phase of the subject. I should like to go into the many other theories advanced if time permitted.

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mental condition. With a few of them—the most exaggerated ones—the symptoms seem permanent and impossible of material alleviation. With many others the line between a satisfactory equilibrium and the existence of symptoms is narrow; the slightest strain is sufficient to disturb it. The symptoms that an enteroptotic woman develops are fairly well defined—pain in the back and groins, a feeling of weight and bearing down in the lower abdomen, disturbances of digestion, menstruation and urination, and a long series of disturbances psychoneurotic in character. It may, in fact, be said that the enteroptotic woman, when once her equilibrium is disturbed, develops symptoms principally neurasthenic in character. Perhaps, however, they should not all be classified as such. The pain above referred to should, I believe, be ascribed largely to the muscular fatigue and, occasionally perhaps, to the strains and secondary phenomena which a faulty attitude induces.

In the study of enteroptotic women one early asks the question as to what part the prolapse of the organs themselves plays in the symptomatology; it is not uncommonly assumed that it is directly responsible for the pain, nervousness, disturbed function and ill health. Here is a mechanical defect—what more simple than that it should cause the woman's symptoms? That this hardly reflects the truth is easy to determine. In a large percentage of our cases at least, disturbances of function have plainly followed exhausting influences and are, I believe, to be regarded as symptoms of them. Although such disturbances occur very frequently in enteroptosis, they are of the same general variety as those seen in other neurasthenic women. Nervous exhaustion is, I believe, the immediate cause of the disturbed function; at least, in most instances, and I have found it to correspond to such exhaustion rather than to the degree of prolapse. It is not, I am convinced, due in the vast majority of instances to any mechanical obstruction—for example, the

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inability of the prolapsed stomach to evacuate itself because its lower pole lies low in the abdomen, or of a colon to evacuate itself simply because of its position. One frequently sees women with stomach and bowels prolapsed to a marked degree whose digestions are to all appearances good. The *x*-ray ordinarily shows no definite signs that may be safely interpreted as mechanical obstructions of the alimentary canal, nor does examination at operation show hypertrophy or dilatation, such as one would expect as the result of such obstruction. It is, however, perfectly possible that certain secondary changes may take place in such a colon as may cause abnormal function, but this I believe is not the rule.

The prolapsed organs do not ordinarily cause the pain referred to above. In a state of exhaustion it is common for the enteroptotic woman to have pain which is usually assumed to be caused by a dragging of the viscera on their attachments. The thought lies near that the pain is due rather to an insufficiency of the trunk muscles. This is one of the points in the study that will bear further investigation. Mere expression of opinion cannot, of course, decide it.

In a study as to the cause of prolapse one naturally asks the question when in the life of the individual it began. I have questioned some 300 women carefully in regard to the state of their nutrition and health during childhood and, although it would be almost impossible to classify satisfactorily the answers obtained, I have gathered from them certain facts. The enteroptotic woman of pronounced degree may always trace certain primary characteristics—namely, the lack of nutrition and vigor—to her childhood (Figs. 5 and 6). It is unquestionably a fact, then, that the frail, thin, weakly girls, who remain so during much or all of their childhood, become later enteroptotic women. In a vast majority of cases the anomaly may be traced with directness to a similar bodily condition in her immediate progenitors; that is, there is here a fixed hereditary factor

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Fig. 3.—Typical enteroptotic figure, fairly well-nourished, little muscular insufficiency, palpable right kidney, lower pole of stomach two inches below umbilicus (gas method). Has good health. Note size of thorax and waist as compared with pelvis. Thorax depth 15 cm., width of waist 18 cm., index 88., height 170 cm. (5 ft., 6¾ in.), weight 116 lbs.

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Fig. 4.—An enteroptotic figure with extreme emaciation, shown simply to bring out certain points referred to in text. Note small collapsed thorax, the sharp epigastric angle, the wide intercostal spaces above, the ribs lying close together below and slanting sharply downward and inward; the small waist with corresponding small upper abdominal cavity. Patient presents marked physical weakness, disturbances of many functions and is otherwise apparently a hopeless neurasthenic.

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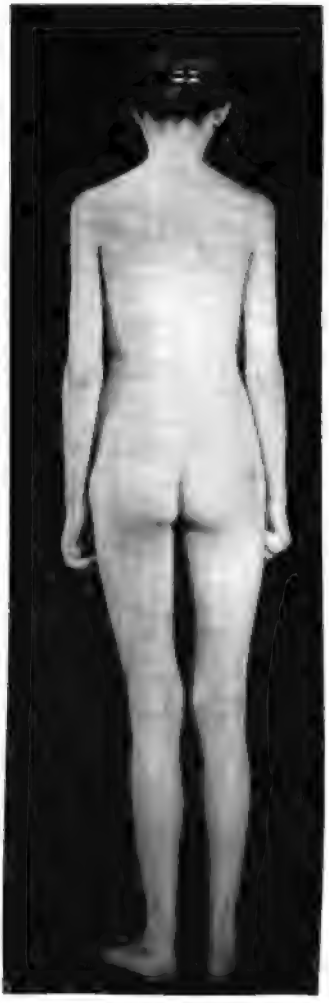

Fig. 5.—Typical enteroptosic figure of adult form in child of 12 years of age. Very poorly nourished, muscular insufficiencies well marked. Height 152 cm. (4 ft., 11½ in.), weight 73 lbs. (73!), thorax depth 14½ cm., waist breadth 17 cm., index 85. Right kidney palpable, lower pole of stomach ½ in. below umbilicus. Frail nervous child, otherwise in good health. (Left kidney had been recently removed for injury.) Note slenderness of form, lack of adipose tissue, small slender muscles and small thorax.

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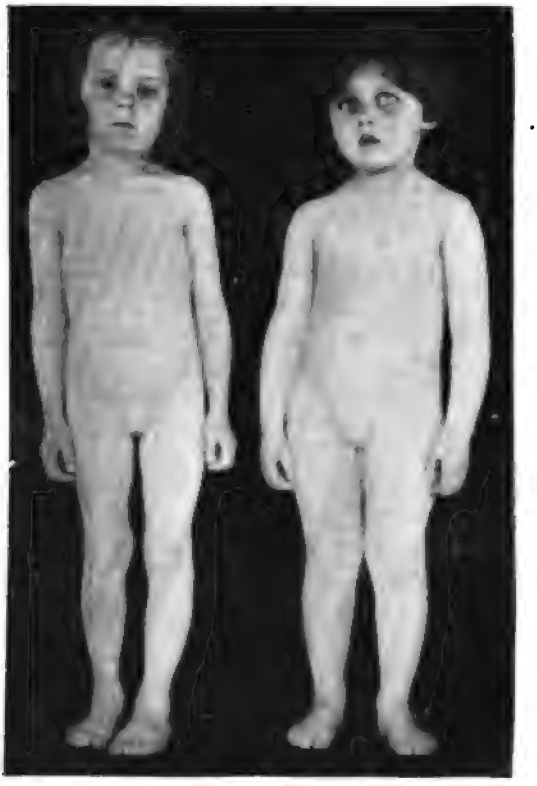

Fig. 6. Figures of children, each 5 years of age. The one is frailer, less vigorous, less well muscled, less fat than the other. Shown to illustrate the type which we find in the history of the enteroptotic woman.

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Fig. 7.—Typical enteroptotic figure of the so-called acquired form, fairly well-nourished, muscular insufficiency well-marked. Thorax depth 17.5 cm., breadth of waist 22 cm., index 75. Right kidney palpable, lower pole of stomach above umbilicus (gas method). Marked digestive disturbance, pain in right side, neurasthenia. Note good size of thorax, low index, bulging anterior abdominal walls and rounding back (muscular insufficiency).

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Fig. 8.—Statue of Venus de Milo. An ideal figure in Greek art, illustrating perfection in development and vigor. Note the muscular development, the large deep thorax, the capacious middle zone of the trunk. One finds that women approaching this ideal have organs in normal position. Compare with enteroptotic figures.

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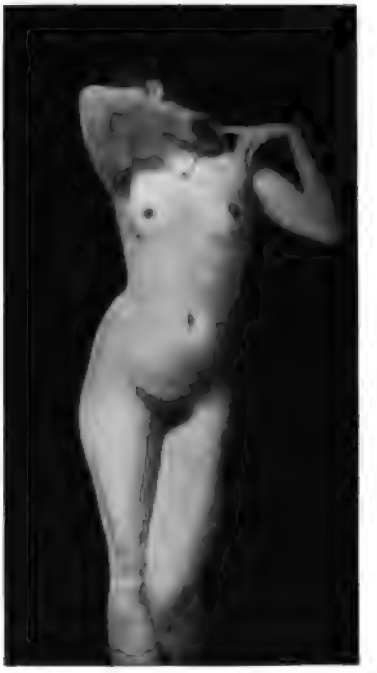

Fig. 9.—Picture from Stratz. Figure of a vigorous woman, the opposite of the enteroptotic one. Note well-nourished body, with sufficient adipose tissue, also the size and depth of thorax. The waist is large, corresponding to capacious upper abdomen.

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Fig. 10.—Picture from Stratz. Figure of vigorous woman. Note the well-developed, well-nourished, muscular body, also the lumbar lordosis and size of the thorax.

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of considerable moment, and we believe that this factor is of the utmost importance, not only in the matter of cause but also in prognosis and management. Its universal recognition and correct valuation by the profession is, I believe, of the utmost importance. I have not been able to show that these children are more liable to infectious diseases; nor, except in very rare instances, could their weakness and ill health be traced to any one illness. It has been my experience that the child who is naturally vigorous and lives in ordinarily hygienic surroundings regains rapidly his usual state of vigor following any temporarily depressing influence, such as acute disease; and I believe that such diseases cannot be said to be a marked factor in the establishment of the enteroptotic habit. I believe, however, that long-continued bad hygiene or chronic diseases affecting the nutrition may be determining factors in early life in its establishment, but this, in my experience, has been exceptional. As a result of failure to recognize the hereditary fundamental constitutional tendencies, efforts have not been uncommonly directed to the relief of local symptoms as if they existed independently. I believe also that bad hygiene has a marked influence on inherited frailness and, conversely, that the best of hygiene may considerably modify its tendencies.

If one questions as to the extent of the prolapse itself during childhood, one must admit that but few exact observations have been made along this line. Butler, of Chicago, in a carefully prepared and excellent paper, read in the Section on Diseases of Children, has examined some 155 children. I have, myself, entered enough into the study to show how different the mechanical conditions are and how little one may depend on the signs on which one is accustomed to rely in the adult. Butler has shown, however, that the fundamental characteristics of the enteroptotic habit are present in childhood—namely, the lack of nutrition and vigor—and that there is at least some tendency to the peculiar adult

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configuration of form and a displacement of the organs to be found at or near puberty. He has found that prolapse of stomach and kidneys in early infancy should not be looked on as signs of the enteroptotic habit. No extensive *x*-ray examinations have been made to definitely determine the position of stomach and intestines in infancy and childhood.

What shall we call the congenital factor above mentioned? Noble would frankly call it a degeneration and would class it broadly with those other degenerations well recognized and of greater degree. He is not alone in this opinion. Martin believes that it is an arrest at some point in development from embryo or a reversion to a lower type. Because of the differences of opinion as to what is meant by the term degeneration and for other reasons, I would prefer at present to merely define it in the terms of the phenomena which are exhibited; namely, a tendency to backwardness in physical development, to poor nutrition and an unstable nervous state.

Lack of nutrition and flabbiness of tissues may be said to be the chief underlying mechanical causes of visceral displacement. Later in life child-bearing becomes a factor to be recognized, since it strains the already weak anterior abdominal wall and tends to increase the general laxness of the tissues. In this connection I may speak of the so-called acquired type of enteroptosis (Fig. 7). The woman, however vigorous and well developed during childhood and girlhood, may, through hard work, child-bearing, or other untoward influences, bring about a laxness of tissues and bulging of her abdominal walls; and in such a woman it is not infrequent to find a palpable kidney and other organs downwardly displaced. It must be emphasized, however, that the degree of prolapse of the abdominal viscera in these cases is of much less degree than that found in true enteroptosis. It is common, however, to see the conditions mixed. In the already enteroptotic woman, if the

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cause above mentioned is added the prolapse is still further increased.

In a physical study of these four or five hundred women I have met women of almost every age, state of nutrition, habit, attitude and body configuration. From the viewpoint of enteroptosis it has served to bring out the fact that enteroptotic women form by no means a sharply defined group by themselves. On the contrary, there is nothing approaching a line of distinction. On rare occasions the physician sees a woman who has an almost ideal physique.‡ Such a woman has a figure closely conforming to the ideal figure of Greek art—a deep, large thorax, a voluminous upper abdomen, tissues firm, muscles well developed and sufficient adipose tissue to round out her angles (Figs. 8, 9, 10). With this ideal at one end of the scale and the markedly enteroptotic woman at the other, one meets all gradations. The women that are commonly called enteroptotic are those in which the anomalies are well developed. As they advance in life many of them gain weight and in this state the fundamental defects in their constitution may be easily overlooked. An inspection of the thorax gives one the quickest hint as to the patient's true constitutional makeup. I have not been able to learn by *x*-ray evidence the effect of a gain in weight on the visceral prolapse but I believe it to be a considerable one for the better.

I have purposely left much to be considered by others. My idea here has been to give, if I could, a broad estimate of the subject in general, based largely on my individual study. Much remains to be done. The profession is slowly establishing a substantial basis for the more practical and useful problems that are to be met and dealt with. A clear recognition of the defects that these women have to contend with—

‡ It must be understood that a large percentage of the women who come to the gynecologist are of less than the average vigor and that it is probable that a large number of ideal or nearly ideal women could be found in any community

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their tendencies, the real nature of their symptoms and, above all, the early history of their lives—I hope, will lead to an intelligent management during childhood and more intelligently directed efforts later on.

Wonderly Building.

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THE *X*-RAY DIAGNOSIS OF ENTEROPTOSIS

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The *x*-ray diagnosis of enteroptosis is at once a simple procedure with definite conclusiveness. The *x*-ray furnishes a method to determine with exactness the position of the large and small bowel within the abdominal cavity.

This examination does not demand an *x*-ray equipment above the average. A 12-inch coil, with electrolytic interrupter and a tube capable of standing a primary current of 20 amperes for thirty seconds will suffice.

On account of the comparatively equal densities of the abdominal contents, it is necessary to render the colon transparent or opaque in outline. The following means may be used to adapt the colon to Roentgen examination:

1. Inflation with air, per rectum. This method is not satisfactory because the air-pressure within the colon is unequal, and, further, does not give an exact record of the lumen of the colon on the fluoroscopic screen or negative.

2. The distention of the colon with opaque emulsions, injected per rectum. Distention by injected emulsions produces a colonic distention with uniform filling pressure when properly conducted.

The technic of the rectal injection is as follows: The patient, having had an intestinal cleansing previously, is placed at ease on the left side, with hips elevated. There should be complete relaxation of the abdominal

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musculature. A soft rubber tube, about one-fourth inch lumen, is inserted, and the emulsion allowed to flow gently, as the first portion of the injecta may produce colonic contractions that would foil our purpose. The pressure of the flow should be about 8 to 20 inches. The injection should require about thirty minutes for 2 quarts of emulsion. The examination within the next hour will disclose the filling of the large intestine to the ileocecal valve. The average capacity of the adult rectal ampulla is 1 pint, and of the large bowel 3 quarts.

3. Distention of the colon with opaque substances ingested with food. By this method the residue of a bismuth meal is radiographed in the colon, sufficient time (usually sixteen to twenty-four hours) having elapsed since its ingestion to insure its presence in the colon.

Opaque substances of radiographic usefulness include, first, the bismuth salts—subnitrate, carbonate, subcarbonate and oxychlorid. Of these, the oxychlorid is best, not having any deleterious effects and not undergoing chemical change. The subnitrate has been discarded because of some unfavorable reports and the care necessary in its selection commercially. Second, the iron preparations, including manganate of iron.

For ingestion by mouth, these opaque substances must be held in suspension by a gruel, or porridge of rice, milk and bread, meal of peas, oatmeal, etc. I myself use about 2 pints of porridge, into which one or two ounces of bismuth oxychlorid is thoroughly mixed, flavored with raspberry syrup or grape-juice.

For an injection per rectum, I use an emulsion of 2 ounces of bismuth oxychlorid in 32 ounces of milk, with 4 drams of acacia to sustain the bismuth, or an emulsion of olive oil and bismuth oxychlorid. It is worse than useless to draw diagnostic conclusions from the injection of simple bismuth in water.

The *x*-ray diagnosis may be made by (1), fluoroscope, or (2), radiograph.

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1. The fluoroscope examination should be conducted in a room of absolute darkness, on a good protected fluoroscopic screen of a size (11 by 14 or 16 by 20 inches) sufficient to cover the entire field of inspection. The fluoroscopic outlines of the opaque colon may then be charted on the glass covering to the fluoroscopic screen and this transferred to paper for a permanent record. If the physician or Roentgenologist is provided with fluoroscopic apparatus that protects the patient and operator, this examination may be conducted expeditiously and without the tedious detail of the radiographic exposure. But without good fluoroscopic apparatus, one is confined to a radiographic technic.

2. The radiographic examination should be made with a plate not less than 11 by 14 inches in size, usually 14 by 17. The plate should be placed with the emulsion surface against the abdomen, the umbilicus having been marked with a copper cent, attached with adhesive, and the tube opposite the fourth lumbar vertebra and at a distance of 20 to 22 inches from the plate. The use of the usual *x*-ray plate will usually give sufficient detail with an exposure of ten to thirty seconds, with a primary current of 20 amperes, through a 12-inch coil and a tube of medium penetration. The topographic outlines of the colon alone being sought, it is quite satisfactory to shorten the exposure and increase the contrast by means of an intensifying screen, especially the new Gehler-Folie or Sinegram screen, which produce negatives relatively free from small flecks.

The interpretation of the radiographic and fluoroscopic shadows is greatly enhanced by study and experience. Before examining by the fluoroscope, the observers should remain in absolute darknesss for ten minutes to secure an ocular accommodation. This is especially advisable to one unfamiliar with fluoroscopic shadows.

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The landmarks of our *x*-ray picture are the umbilicus and ensiform cartilage, marked by pieces of metal, and the wings of the ilium. The shadow of the cecum should be within the wing of the right ilium. We may then trace the colon to the hepatic flexure. In a well-filled colon we may see the hepatic angle completely filled with the emulsion, but sometimes the apex of the angle will show some transparency produced by retained air. The splenic flexure is higher than the hepatic, and also shows a sharper angle with air at the apex. The shadow of the transverse colon should be noted in its relation to the umbilicus and its movability noted by direct abdominal manipulation. To determine the movability of the colon in radiographs, it is necessary to take two exposures; one with the patient standing, the second with the patient in the Trendelenburg or prone posture. The study of the movability of the colon and possible adhesions thereto is best accomplished by the fluoroscope.

The hepatic and splenic flexures of the colon may appear sharply angled with possible kinks. This is usually faulty interpretation, as what appears to be an angle is really a curve, the upper portion of the ascending colon being overshadowed by the first part of the transverse; likewise, the first portion of the descending colon may be overshadowed by the distal portion of the transverse colon. If there be a kink that obstructs, there is a damming up of the opaque emulsion on the side from which the emulsion was introduced.

To avoid errors in the estimation of the distance of the transverse colon above or below the umbilicus, it is necessary that the direction of the *x*-ray delivered from the *x*-ray tube strike the fluorescent screen or plate at a perpendicular, and at a point on the back opposite the umbilicus, about the fourth lumbar. In the study of a particular portion of the colon, where adhesions are suspected it is desirable to diaphragm down to the area on the fluorescent screen. This is not necessary

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in radiographs, as the entire colon may be studied at leisure, but without the advantage of continued observation under manipulation that the fluoroscope affords.

CONCLUSIONS

Having rendered the lumen of the colon opaque, it is possible to record exactly, either by fluoroscope or radiograph, the position of the colon in its relation to the umbilicus and bony skeleton. The fluoroscope will give diagnostic information beyond the radiograph, in that changes in position of the colon, due to manipulations and adhesions, may be studied.

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ENTEROPTOSIS—THE PHYSICIAN'S VIEW POINT

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It is possible that there has been an exaggeration of the importance of congenital gastroenteroptosis as a factor in the production of symptoms. Investigations by modern methods, as the *x*-ray, show that this ptosis is of frequent occurrence when not suspected. The individual is without symptoms unless some complication, as an inflammatory lesion, arises. Independently of such complication, if symptoms are present, they can be demonstrated to be due to other factors. These factors of ill health in the large proportion of cases are the result of antagonistic environmental conditions, which in an individual handicapped by congenital insufficiencies, are not met by healthful reactions of the organism. In consequence the organism is overwhelmed. The environmental conditions are those which make for effeminacy in our life. Modern types of living, overstimulation of the nervous system by all forms of excitement, improper diet, foolish amusements, excesses and irregularities of all kinds are the factors productive of symptoms in gastroenteroptosis. This view seems to be supported by the fact that the laboring classes are not often victims of that symptom-complex of general and visceral neuroses, which is so common in the leisure classes. It may also be said that the victims of the neuroses with enteroptosis are usually members of a family in a period of involution. They are luckless survivors of a family about to become extinct. They may have

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stigmata of degeneracy and are almost sure to have the type of thorax known as the phthisical or paralytic. If one traces the morphology of antecedent generations, it can be seen that with each generation there is structural evidences of physical decline.

Moreover, one is supported by the clinical evidence and by the results of treatment in the view that the enteroptosis is only part of a general condition, and is not of itself sufficient to give rise to symptoms. Through the clinical evidence we learn that the morphologic condition and the clinical expression of any gastroenteric insufficiency is seen in the statement that from childhood there has been poor health and that abdominal symptoms always obtain. Thus, in one hundred cases of gastroenteroptosis taken without selection from more than six hundred cases, and not divided into congenital and acquired, the evidence is strong that 37 per cent. had always been in poor health, while 27 per cent. had presented symptoms from a time when the strain of evolution was a factor added to the congenital condition. Unfortunately, the history does not record the general conformation of the individual, which enables one to predict ptosis, and which prediction is almost always confirmed by exhaustive examination.

The results of the treatment or management of such cases lend further support to my view. I have in mind many individuals with gastroenteroptosis in childhood who, notwithstanding that they often were of involution family groups, escaped the many perilous ills familiar to us as belonging to this period, because of favorable environmental conditions. They had the advantage of a robust sensible home life and of conscientious, wise mothers. They had every environmental agency that makes for health, a rational education and normal amusements. Some of the girls have grown under my eye to be healthy mothers of families, and the boys to be wise dispensers of their strength, which has made

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them normal members of a community, though not overbearing because of their powers as athletes.

Finally, I may state that I have made metabolic analyses in ten of these cases of enteroptosis without finding any important evidence of malnutrition or perverted nutrition or of a toxemia which could fairly be attributed to an uncomplicated enteroptosis. Furthermore, I can state, although with some qualification, that whatever indications of toxemia I have found in such cases as indicanuria or alteration in the proportion of the sulphates, or of changes in the feces indicating fermentation, etc., such modifications can be ascribed by the neurosis which accompanies the congenital insufficiencies.

In short, with such a congenital morphologic condition, there is also a state of the nervous system attended by visceral hyperesthesia which if not carefully guarded against brings with it a state of introspection, the ensemble of which is typical of the neurosis of enteroptosis. Any attempt, therefore, to relieve such conditions must be directed not to any one part of the organism but to the organism as a whole. Any attempt which will render one part of the organism more hyperesthetic, as will operative procedures, will increase the neurosis, and delay recovery temporarily or even permanently.

If, then, we must not allow ourselves to consider enteroptosis as a single factor, what can be done to relieve any symptoms to which it apparently gives rise? I take it that we agree that such symptoms are the result of secretory neuroses, gastric and intestinal, and motor insufficiency with secondary toxemia. Let us inquire into the defenses and adaptive powers which the organism possesses, provided the individual listens to the responses of the organism as seen in the reactions it manifests. Unfortunately we are brought face to face with the problem long after the organism has become oblivious of these responses, when the reactions are negative features.

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Indeed it is the ever-watchful eye of the mother in the early periods of the child's life that usually detects them, and if bridge and teas and other diversions of our vaunted modern life do not distract her from her duties, she controls the reactions, represses them when in excess, stimulates them when deficient and carefully guides the child into normal adolescence and healthy manhood or womanhood.

The defenses the organism possesses against such insufficiencies are only those which conserve health. If watched for it can readily be seen that such an individual has limitations which must not be disregarded. The so-called bilious attacks, the attacks of exhaustion, of headache, of nervousness, the various neurasthenic and hysteric phenomena are expressions of fatigue of an organism which cannot mark time. The defenses of the organism are rest and temporary abstinence or moderation in all things. If these efforts of the organism are not frustrated by an ambition along the social or educational lines these defenses will be rationally encouraged. They will not be thwarted by the stimulants used to goad tired Nature and by narcotics, both of which it is true are likewise more in vogue later in life, establishing before long a vicious circle and reducing the organism to a state in which its existence depends on artificial conditions. In short, we must combat not only the congenital insufficiency, but also the fatigue neurosis which attends it.

It is not only by the defenses of rest (physical, mental and emotional), that we see the organism meet the insufficiency of its powers, but by adaptation also. This is seen in the development of a tolerance to any intoxication (an exaggerated factor, however, I believe), in the occurrence of hypertrophies to overcome obstructive lesions, and of secretory balance to mitigate any aberration in that line. If the organism has half a chance the chemical correlations and internal secretions will take care of the insufficiencies.

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It will be asked if the organism has even a modicum of defense and adaptation, why it is necessary to invoke the aid of the physician. The answer is that the defensive and adaptive powers have not been heeded and that every excitation or irritability which arises from weakness of the organism invites excesses beyond the power of the organism. The individual does not live down to his strength but spends both income and capital to the verge of bankruptcy.

Inasmuch as failures of defense occur, as seen in women after nervous strain or after childbirth with its accompanying anatomic and physiologic changes, and in growing males after misguided athletic endeavors, or in still more vicious effeminacy and stimulation of the adolescent period, what can be done to aid the organism? Aid it needs, and in any attempt to assist we must realize that not only is the organism handicapped, but the symptom-complex indicates that the organism as a whole, its vital powers and environmental conditions, play a large, if not the most important part in the production of symptoms. It must be realized that it is not a disease but a condition which confronts us. It is one thing to manage a condition and another to treat a disease. The former requires all the resources we may have at our command along lines of physiologic therapeutics; the latter requires us safely to conduct the organism to health by methods of antagonism, neutralization, counteraction, destruction, direction and assistance, which are physiologic and pathologic. Above all, the former requires the wholesome tonic influence of a robust personality in the physician and other individuals associated with the patient. It is not for me to present a homily on hygiene. I may be permitted, however, to urge that the general principles and methods of hygiene should be invoked and applied in directions specifically suitable to the individual patient; that to this must be added an indirect therapy based on a correct estimate

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of the functional value of each organ or system. That it is necessary to treat the eyes, the muscular system, correct postural defects, and all the organs requiring it, goes without saying.

It is evident that there is no specific, and it is likewise evident that no insults to the nervous system are to be permitted by injudicious surgical procedures. A little relief can often be obtained perhaps psychically, but also physically by the use of a bandage. A notable result by such treatment was seen in some of the one hundred cases previously mentioned. A bandage was ordered for nineteen patients in whom the history indicated a congenital origin; five were much relieved, ten a little relieved and four experienced no relief. About 25 per cent. thought it worth while to wear a bandage. Drugs may be employed, as iron, nux vomica, physostigmin, and also laxatives, of which the most effective is rhubarb. Now and then sedatives of mild form, as the bromids, sumbul and valerian, may be judiciously employed.

We must pause a moment to consider the congenital visceroptosis, on which acquired physical conditions are engrafted, which lead to obstructive symptoms, chronic constipation and its secondary disorders. A different condition confronts us. Hence the judicious surgeon or internist must estimate the relative effect on the organism of operative procedure, and of a continuance of the abnormal conditions. I am free to admit that the presence of inflammatory adhesions, of undue dilatation or of obstruction, demands the intervention of the surgeon.

Here also a word may be said of the patients with visceroptosis who cannot have the opportunities of hygienic treatment which I have spoken of. Such are unable to carry on their usual avocations and are practically helpless; for them a chance must be taken, and it may be wise to resort to surgical procedure.

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The acquired visceroptoses are most amenable to surgical treatment. If judicious abdominal support, the repair of losses of external support and indirect and hygienic therapeutics are not of avail, resort to surgical procedure is necessary.

What I have said regarding operative procedure in congenital ptoses may have to be qualified with the turn of a night. The argument that the enteroptosis should not be treated by surgical measures because other congenital states exist, and notably those of the nervous system, might be applied to other congenital conditions. It might be said for similar reasons that one should not operate on hare lip or cleft palate. If we could recognize congenital ptoses early and before the neuroses develop we might be able to forestall the ill effects of insufficiencies. Who knows but that in the near future such early recognition will be possible, and early remedial surgical relief applied?

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SURGICAL ASPECTS OF ENTEROPTOSIS

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In order to obtain a useful and practical view of the surgical aspects of enteroptosis it seems important to refer at the outset to the causation and development and incidentally to prophylaxis.

Since enteroptosis as a definite condition was brought forcibly to the attention of clinicians by Glénard a quarter of a century ago, many careful observers have been convinced of the fact that patients who suffer from marked enteroptosis are as a rule congenitally deficient anatomically and that their deficiencies are constantly exaggerated during childhood and more especially in females during the increased physical and physiologic burdens of childbearing.

Four years ago, R. R. Smith[1] directed our attention to enteroptosis with special reference to body form; and recently Reynolds and Lovett have shown that the condition occurs in persons of peculiar postures whose bodies are not normally balanced when they are in the erect position. Round-shouldered patients with hollow backs, large pelves and small chests are especially well formed for the development of enteroptosis. This naturally suggests an important field for prophylaxis through careful orthopedic treatment, especially of

1. Smith, R. R.: Tr. Am. Gynec. Soc., Philadelphia, 1906.

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young women and children. Reed and Robinson[2] have observed gastroptosis in 37.6 per cent. of the tuberculous patients they had an opportunity to examine in a sanitarium.

Personally I have observed a very large number of children under the age of 12 who came under my care for the treatment of hernia produced from excessive intra-abdominal pressure in whom there was a marked degree of enteroptosis with diastasis of the recti muscles and pendulous abdomen.

The abnormal intra-abdominal pressure in these cases was due to one or more of the following causes: (a) digestive disturbances with gaseous distention of the stomach and intestines; (b) constipation; (c) phimosis with obstruction of the passage of urine; (d) chronic coughs complicating one or the other of the above conditions; (e) chronic appendicitis; (f) severe straining during the act of crying usually caused by pain due to one or more of the above conditions.

In these cases I have found that by removing the cause of the increased intra-abdominal pressure not only was it possible to cure the hernia without operation but the enteroptosis improved greatly in all cases and was entirely cured in many.

The intestines, no longer being overdistended, were able to contract to a normal size; the reduction in the amount of intestinal contents undoubtedly permitted the elongated mesentery to contract into its normal length; and the muscles of the abdominal wall were able to shorten and thicken and to hold the abdominal contents in their normal relation above instead of in front of the pelvis, especially when the treatment was instituted early enough to permit the diastasis of the recti muscles to disappear.

Aside from relieving the abnormal intra-abdominal pressure in these children, more especially by the regu-

2. Reed, Boardman, Robinson and Neal, Frank: South. California Pract., November, 1908.

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lation of time of feeding and quality of food and by this and other means overcoming constipation, their habits of rest were regulated so that they retired to their beds at 6. The foot of the bed was elevated so as to make an angle of 15 to 30 degrees between the planes of the bed and the floor. This virtually placed the patient during the hours of rest in the Trendelenburg position in order to force the abdominal viscera to gravitate toward the diaphragm, which enabled all of the supporting structures to recover from the strain to which they had been exposed by the abnormal intra-abdominal pressure.

The obstetrician has accepted his share of the prophylaxis and the orthopedist is at the present time eagerly searching out his share in this work. We must now ask the pediatrician and the dietitian to take their respective shares in reducing the number of these cases; then, after the gynecologist has disposed of those belonging to his especial field, the remaining cases must be viewed by the surgeon in a most critical way from several standpoints.

In the first place, in a vast majority of patients with enteroptosis this condition does not materially affect the disease from which the patient is suffering; and, in the second place, in a vast majority of patients in whom the presence of enteroptosis does affect or cause the disease from which they suffer, surgical treatment either fails altogether in producing relief or it introduces other conditions incidentally which in themselves cause abnormal conditions worse than those from which relief is sought.

Joseph Blake gives as an indication for operation the following conditions: First, it must be determined that the patient's suffering is due to enteroptosis; second, it must be clear that the condition cannot be relieved without surgical interference; and third, it must be reasonably certain that the condition can actually be relieved by a surgical operation.

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It seems that enteroptosis is the cause only in cases in which its presence produces obstruction. The obstruction may be caused simply by a more or less marked angulation, or even by torsion, especially if the enteroptosis is complicated with adhesions. A stomach whose ability to empty itself in the normal period of time has not been impaired should never be operated on for enteroptosis. If the latter condition causes obstruction of the pylorus surgical treatment should be considered: consequently the presence of gastroptosis in itself should never be considered an indication for surgical treatment. The same is true of nephroptosis. In the examination of a large number of foreign-born working women I was able to confirm the statement of Pavlick that 75 per cent. of the women of this class who have repeatedly borne children have right-sided nephroptosis; but I have also found that this condition is of no importance unless it gives rise to obstruction of the ureter and overdistention of the pelvis, a condition which is usually due to an abnormal arrangement of the blood-vessels of the kidney. In most cases it is possible to demonstrate the acute bending of the ureter over the abnormally placed vessel. But the number of these cases is very small in comparison with the number of cases of nephroptosis.

There is also a small class of patients in whom the nephroptosis interferes with the circulation of the kidney giving rise to albuminuria. In these cases nephrorrhaphy is also indicated.

Enteroptosis of the small intestines is still less important unless complicated with adhesions which may be simply a complication or in other cases these adhesions may be partly responsible for the enteroptosis.

The splenic and hepatic flexures of the colon are the only portions of that organ that are rarely involved in enteroptosis; the cecum, transverse and descending colon and the sigmoid flexure may be found at any level of the abdominal cavity. This is probably due in

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most cases to faulty fetal development, as shown by Babcock and others. Whenever the malposition of this organ is sufficient to cause so much obstruction to the passage of feces as to impair the patient's health because of the resultant malnutrition or auto-intoxication, the operation introduced by Mr. Lane for the removal of the offending portion of the colon is undoubtedly the most rational form of treatment, but in this country this operation is but rarely indicated, primarily because the habits of Americans preclude the conditions of fecal accumulation encountered in so many patients of the lower classes in some European cities. In the greatly exaggerated conditions encountered in Hirschsprung's disease, excision is of course invariably indicated, preferably by the simple method described by Judd.[3]

In our clinic we find ptosis of the transverse colon in more than 25 per cent. of patients operated on for other conditions in whom this condition has no relation to the disease of the patient and is undoubtedly either congenital or due to abnormal intra-abdominal pressure during childhood.

In case of obstruction to the ureter due to nephroptosis nephrorrhaphy is indicated by one or the other of several efficient methods which have been thoroughly tried. In gastroptosis, causing pyloric obstruction the operation for supporting the stomach introduced by Beyea[4] is indicated, because, while it overcomes the mechanical difficulty in the case, it does not fix the organ. All operations which serve to fix intra-abdominal organs for the relief of enteroptosis are bad because they introduce a condition resulting in much more harm than is done by the enteroptosis itself. The intra-abdominal organs are normally in a floating condition which insures comfort to the patient and protects these organs against jarring, hence the necessity of maintaining this condition.

3. Judd, E. S.: Journal-Lancet, Jan. 1, 1909, St. Paul, Minn.
4. Beyea, Henry D.: Am. Med., Oct. 8, 1904.

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The relief of the condition of ptosis of the pelvic organs has been thoroughly studied and described by those interested, especially in the field of gynecology.

Here also the fixation of organs has been wisely condemned. One condition should be mentioned here because it is constantly encountered both by the surgeon and by the gynecologist, I refer to the pendulous abdomen which Quincke[5] discussed fully in connection with all forms of enteroptosis. When present in connection with umbilical hernia it should be relieved by a very extensive sliding of transverse flaps introduced by W. J. Mayo for the treatment of umbilical hernia. When no umbilical hernia is present, then we should employ the method of overcoming the diastasis of the recti muscles introduced by Clarence Webster, consisting in laying bare the rectus abdominus muscle on either side of a median incision by laying open the fascia and then suturing all of the layers successively securing union between the internal edges of the recti muscles. In all cases, no matter what the condition may be, for which the patient has been subjected to an abdominal section in which enteroptosis and diastasis of the recti muscles are present, this operation is indicated.

The important point about this operation comes from the fact that it corrects the vertical relation of the intra-abdominal viscera to the pelvis, placing them above instead of in front of the pelvis.

We still have to account for a ptosis of liver, gall-bladder, urinary bladder and spleen.

In a moderate degree of ptosis of the liver relief can be obtained by making a longitudinal incision parallel with the right rectus abdominis muscle and splitting this muscle longitudinally for a distance of 5 cm. downward from the last rib and then suturing the gall-bladder to the edge of the wound, the sutures grasping peritoneum and transversalis fascia. The gall-bladder should be opened and drained for two or three weeks,

5. Quincke, H.: Therap. d. Gegenw., 1905, xlvi, 10.

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which will usually result in a marked decrease in the size of the liver.

The same operation gives relief in patients suffering from ptosis of the gall-bladder, which is frequently accompanied with an accumulation of thick, viscid sandy bile or gall-stones in the gall-bladder with more or less obstruction of the cystic duct. These patients should cease wearing corsets and should wear their skirts suspended from their shoulders in order to remove the abdominal pressure from these sources.

In extreme cases of ptosis of the liver the anterior surface should be roughened by friction with dry gauze and a number of chromic catgut sutures should be used to unite the anterior surface of the liver with the parietal peritoneum. The fixation thus obtained is not nearly so satisfactory as the support obtained by the cholecystorrhaphy in the milder cases.

In ptosis of the spleen operation is indicated only when there is obstruction due to extreme mobility of the organ suspended by a long pedicle. A pocket may be formed of the peritoneum into which the loose spleen is fastened. I have removed the spleen in such cases, but the experience in either of these operations is too small to be valuable.

In all cases of enteroptosis, dietetic and hygienic measures must be employed in the after-treatment in order to eliminate as far as possible, abnormal intra-abdominal pressure from every source, but especially from gaseous distention and constipation.

2106 Sedgwick Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. SKINNER, MUSSER, OCHSNER AND SMITH, FORMING A SYMPOSIUM ON ENTEROPTOSIS

DR. MAX EINHORN, New York: I think it was in 1895 or 1896 that my paper on "Movable Kidney and its Treatment," was published in the *Medical Record*. At that time most movable kidneys that were recognized, were operated on, and I think I stood almost alone in the opinion that movable

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kidneys should not be operated on. It is not movable kidney alone that gives the trouble, but there is usually associated a movable stomach, or liver, or other organ. Such conditions are found more often in women than in men. Whether or not it is congenital is difficult to state. I am of the opinion that in some cases there is congenitally a tendency to develop such anomalies. That such conditions exist in normally developed children, who later develop affections that lead to enteroptosis, we have ample proof in the fact that proper treatment brings permanent cure. If the condition existed from birth this would not be so. Another point is that a strict diet is just the opposite to what is required. In all these patients, unless there is a strong contraindication, it is important to make them eat. The patient may tell you that he cannot eat eggs. If you will allow this to guide you, you will never succeed. Tell your patient to eat a little at a time, and that in two or three weeks he will find he can eat everything, and that is the only way to cure such patients.

I do not think that enteroptosis as such gives rise to great disturbance of the motility of the stomach. If you find food in the stomach in the morning with a prolapsed condition, the prolapse is not the cause of the stomach not being emptied. There may be some other condition associated. I would say that this is not a phenomenon of enteroptosis.

Dr. R. C. Coffey, Portland, Ore.: It is pleasant to see an afternoon devoted to this subject in a surgical section of the American Medical Association inasmuch as many of the leading surgeons of our country have absolutely opposed surgical treatment of these cases. The first patient whom I treated surgically was one in whom I could find nothing else wrong. The patient had gone from the condition of a strong, healthy woman to a condition of severe vomiting, just as if she had an obstructive ulcer at the pylorus. I had heard of nothing at that time that had been done on the subject. I told the patient's husband what I would like to do in the case and he consented. I sutured the omentum to the abdominal wall.

The patient fully recovered and weighs 160 pounds; she weighed 80 at the time of the operation. Since then I have operated on 22 other patients for ptosis of the stomach. I think Dr. Clark has given us one of the best pieces of advice to-day: not to operate for the pathologic condition as it appears from the clinical examination, but to operate for symptoms alone. I remember that Dr. Clark, some years ago, in a paper advocated this operation in certain cases in which he had incidentally found the stomach low down while doing other abdominal operations. I am glad that he has changed his opinion. We never should operate on the stomach simply because it is low. In but two cases have I operated in which

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the patient was not an absolute invalid. That is the rule that we should adopt. In only three cases have I operated for general ptosis. Most of my operations have been for prolapse of the stomach alone. Four patients had displaced liver and one or two had displaced kidneys. There were two cases of general ptosis; operation was done in two stages. In one case the patient had been an invalid for five years. The stomach was also prolapsed and the uterus retroverted, as is common in these cases. I anchored the stomach, liver and kidneys, and suspended the uterus at one operation. I found the congenitally narrowed condition which had been mentioned and on attempting to close the abdomen it seemed too small. I had then turned the fascia of the rectus in from above, leaving only the posterior portion of the fascia, thus extending the abdomen at least two inches. Six weeks later, I made two incisions, one on each side midway between the umbilicus and anterior superior spine of the ilium, and parallel to the fibers of the fascia of the external oblique. The fascia was overlapped for two inches on each side, as shown in article in *Surgery, Gynecology and Obstetrics*, thus changing the entire contour of the patient's abdomen. The patient is doing her own work and feels absolutely well. In two other cases I did the same thing.

DR. C. F. P. KORSSELL, Chicago: I emphatically believe in the surgical treatment of enteroptosis. I have had some little experience and endorse the view of intra-abdominal pressure being a causative factor of great importance. In seventy-four women and two men operated on for enteroptosis by a new method, sixty-three had previous diagnosis and were deliberately operated on for its relief. Eighteen of them had previously been operated on for gynecological troubles without relief. My work has been in aggravated cases, in patients prostrated, useless, and with life a burden. They have been mostly those complicated with pelvic troubles and in quite a large percentage the small intestines were principally involved, being prolapsed into the lower pelvis below the promontory of the sacrum and bent back around its acute angle, usually with the uterus pressed down, retroverted and the fundus resting on the intestines, compressing them against the sacrum. The operation is done through a transverse or the usual incision, above the symphysis. After raising the intestines and emptying the pelvis completely of intestines, packing them out of the way, an incision is made in the posterior peritoneum about one inch long just to the right of the rectum, either transversely or longitudinally; then grasping the cul-de-sac of Douglas, or, in some cases, the neck of the uterus, well down with a tenaculum forceps and approximating it posteriorly to the sacrum just below the promontory

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and stitching it into the cut in peritoneum with chromicized catgut or silk, a firm anchorage is secured for the uterus posteriorly and permanent suspension. The same procedure is carried out to the left of the rectum with or without incising the peritoneum. The sutures are continued on each side from these central points of suspension for sewing the broad ligaments on the same level to the sacral peritoneum, a half-inch below the promontory, until the true pelvis is entirely closed up by a diaphragm of double layers of peritoneum. which experience has shown to be of ample strength to keep the abdominal organs out of the pelvis.

I have deferred reporting this work in the hope of having some of these patients come through pregnancy, but have so far waited in vain. However, I do not believe the condition produced would materially interfere or complicate natural labor, especially if one were not in too great haste. Such patients should have ample dilatation of the cervix before resorting to the use of forceps.

DR. J. H. CARSTENS, Detroit: Prevention is the great desideratum. The illustrations of Dr. Smith show the peculiar shape of the body, which indicates the tendency toward general abdominal ptosis. This being the case, we should prevent the latter by systematic development of the body by physical exercise and not too much school work. Why do we have so much ptosis and neurasthenia? Because many of the girls at this age are ambitious; they want to learn and to become stenographers, teachers or members of some other profession, and still they haven't the right kind of brain; they learn with difficulty; they must study hard, until late at night. To make matters worse, perhaps some good aunt pays for a music teacher and they also play on the piano during this stage of development, and then when they are 18 or 19 years old graduate from the high or normal school physical wrecks, with a certain amount of mental development and with a sour and cross temper. We must prevent this condition. Such a girl must stop her education for a few years; she can make it up easily afterward, if necessary. Such a girl must be sent to the country. Let her jump over the fences, chase the cows, feed the chickens, fall in the river, swim, row a boat; in other words, be a regular "tom-boy." With plain nourishing food, in the course of a few years she will develop into a strong, healthy woman with a virile body, with not so much learning, but with a sweet temper.

DR. A. W. CRANE, Kalamazoo: It seems to me that the usefulness of the *x*-ray examination of the stomach and intestines by surgeons is greatly circumscribed. It is men-

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tioned but little in the books, in journals and in works on the *x*-ray itself. It does not seem to be described in the books on general surgery and medicine. To my mind the *x*-ray examination of the stomach and intestines often furnishes more complete information than experimental operation. A surgeon may not be able to tell whether an ulcer of the stomach is present or not, even though he has the stomach in his hand, but he may be able to tell from the *x*-ray examination that such exists. It seems to me that except in emergency cases, no surgery of the stomach or intestines should be done until *x*-ray examination had been made.

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LIST OF MEMBERS OF THE SECTION ON OBSTETRICS AND DISEASES OF WOMEN

List of present members of the American Medical Association who have registered in the Section on Obstetrics and Diseases of Women during the last five years. The figure following the name indicates the year in which the member registered (8 indicating 1908, 9 indicating 1909, etc.). Any errors which may have occurred should be brought to the attention of the Secretary of the Section.

Abbe, Truman, Stoneleigh Court, Washington, D. C. 9.
Abbott, A. W., Ludington, Mich. 8.
Abbott, B. T., Ocean City, N. J. 4, 9.
Abbott, E. H., 37 Sherwin Bldg., Elgin, Ill. 8.
Abrams, Edw. T., Dollar Bay, Mich. 9, 0.
Adair, J. H., Owatonna, Minn. 8.
Adams, C. T., 5701 Girard Ave., Philadelphia, Pa. 9.
Adams, W. A., Easton, Kan. 8.
Adelsberger, L., Waterloo, Ill. 8.
Agnew, Fred F., Independence, Iowa. 5.
Aird, A. J., Carterville, Ill. 0.
Alexander, A. F., 579 Union Ave., Paterson, N. J. 7, 9.
Alexander. Clara J., Hotel Bristol, Boston. 6.
Allen, Clarence J., Winchester, Mass. 6.
Allen, B., Nashua, N. H. 6.
Allen, H. C., 11 8th St., New Bedford, Mass. 6.
Allen, M. May, 279 Alexander St., Rochester, N. Y. 6, 9.
Alrutz, L. F., Oregon, Ill. 8.
Altman, J. T., cor. Church and Vine Sts., Nashville, Tenn. 4, 5, 6, 0.
Altman, Maurice, 307 Myers Bldg., Springfield, Ill. 0.
Anderson, Alexander L., 467 9th St., Brooklyn, N. Y. 6.
Anderson, H. G., Waterbury, Conn. 9.
Anderson, Winslow, 1065 Sutter St., San Francisco. 0.
Andrews, Frank T., 4589 Oakenwald Ave., Chicago. 4, 5, 6, 0.
Andrews, John, Grant City, Mo. 8.
Andrews, R. B., 524 S. State St., Belvidere, Ill. 8.
Angle, Geo. K., Silver City, N. Mex. 0.
Anspach, Brooke M., 119 S. 20th St., Philadelphia. 9.
Arnold, B. A., Freeport, Ill. 8.
Arnold, J. O., 2503 N. 18th St., Philadelphia. 7, 9.
Astley, G. Mason, 5211 W. Girard Ave., Philadelphia. 9.
Austin, A. S., Aberdeen, Wash. 5.
Ayer, Silas H., 318 Shawmut Ave., Boston. 9.

Bachelle, C. von, 100 State St., Chicago. 8.
Bacon, Charles S., 2156 Sedgwick St., Chicago. 4, 5, 6, 7, 8, 9, 0.
Baer, B. F., 2115 Chestnut St., Philadelphia. 7.
Baer, J. S., 422 S. 3d St., Camden, N. J. 4, 6, 9.
Baker, C. D., Rohrersville, Md. 6.
Baker, Geo. W., 2349 Washington Ave., Ogden, Utah. 0.
Baker, Marshall, Webster Groves, Mo. 0.
Baldwin, L. Grant, 28 Schermerhorn St., Brooklyn. 5.
Bainbridge, Wm. S., 34 Gramercy Park, New York City. 9.
Baldy, John M., 2219 DeLancy St., Philadelphia. 0.
Ballard, C. N., Oklahoma City. 0.
Ball, W. A., Wanette, Okla. 8.
Bandler, Samuel W., 134 W. 87th St., New York City. 7, 0.
Banks, H. L., Hannibal, Mo. 8.
Banks, Rush, Centralia, Wash. 5.
Barbour, E. E., 2913 N. Adams St., Peoria, Ill 8, 0.
Barcus, P. J., Crawfordsville, Ind. 8.
Barnes, C. S., 41 S. 19th St., Philadelphia. 9.
Barnes, Ida C., Topeka, Kan. 5.
Barnes, S. S. P., Massillon, Ohio. 9

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Barrell, Charles S., 425 Beacon St., Boston. 6.
Barrett, C. W., 446 St. James Pl., Chicago. 4, 6, 9, 0.
Bartlett, C. W., 70 North St., Bennington, Vt. 4, 6.
Bassett, C. W., 407 Washington Ave., St. Louis. 0.
Beahan, A. L., Canandaigua, N. Y. 6.
Bean, J. W., 1103 Fidelity Bldg., Tacoma, Wash. 5.
Beardsley, C. E., Ottawa, Ohio. 8.
Beattie, T. J., 504 Shukert Bldg., Kansas City, Mo. 5, 6, 0.
Beck, C. E., Portland, Pa. 9.
Becker, J. N., 382 N. 9th St., Reading, Pa. 4, 9.
Bedal, Adelheid C., 3447 Lafayette Ave., St. Louis. 0.
Beer, Wm. F., 619 Boston Bldg., Salt Lake City, Utah. 6.
Beers, H. E., 1060 E. 14th St. N., Portland, Ore. 5.
Bell, J. F., Elgin, Ill. 0.
Bell, J. N., 506 Washington Arcade, Detroit. 0.
Bellamy, W. W., 17 Bowdoin Ave., Dorchester, Mass. 6.
Belville, Frank, Delaware City, Del. 6.
Benjamin, A. E., 1020 Donaldson Bldg., Minneapolis, Minn. 6, 9, 0.
Bennett, Cleaves, Demaree Bldg., Mattoon, Ill.
Benson, H. W., Oakland, Neb. 8.
Bentele, Elizabeth, 3626 Botanical Ave., St. Louis. 0.
Bentley, Edwin, 617 Main St., Little Rock, Ark. 6.
Benton, E. A., Central City, Neb. 5.
Berndt, Daniel Albert, 804 Gay St., Portsmouth, Ohio. 6.
Berwick, J. C., Berwick, La. 8.
Bierhoff, Frederick, 10 W. 61st St., New York City. 7.
Bishop, S. P., Delta, Ohio. 4, 5.
Black, T. F., Providence, R. I. 6.
Black, W. T., Randolph Bldg., Memphis, Tenn. 8.
Blanchard, Francis R., Lakeview, Mich. 9.
Blanchard, O. R., 37 Clinton Ave., Jersey City. 4, 6.
Blaisdell, Frank, Goffstown, N. H. 6.
Bland, Curtis, Greensburg, Ind. 9.
Bland, P. B., 1729 Pine St., Philadelphia. 9.
Blankenhorn, H., Orrville, Ohio. 6.
Blauvelt, G. F., Nyack, N. Y. 6.
Blender, Wm., Carthage, Ill. 8, 0.
Blinks, E. G., Michigan City, Ind. 8.
Bliss, F. E., Warsaw, N. Y. 6.
Blocklinger, A. H., 11th and Iowa Sts., Dubuque, Iowa. 0.
Blue, C. L., Tocsin, Ind. 8.
Boardman, Wm. E., 388 Marlborough St., Boston. 6.
Bobb, C. S., Mitchell, S. D. 8.
Boldt, Herman J., 39 E. 61st St., New York City. 6, 7, 8, 9, 0.
Bolster, A. S., 323 Pleasant St., Worcester, Mass. 6, 8.
Bond, W. L., Somerville, Mass. 6.
Bonifield, C. L., 3469 Harvey Ave., Avondale, Cincinnati. 4, 5, 6, 7, 8.
Boogher, Frank, High and Carr Sts., St. Louis, Mo. 8.
Booher, W. T., Bethany, W. Va. 8.
Boswell, Charles J., Mounds, Ill. 6, 0.
Boutelle, H. C., Danvers, Mass. 6.
Bovée, J. Wesley, The Rochambeau, Washington, D. C. 4, 6, 7, 9.
Bowell, Bo, Laporte, Ind. 8.
Bower, H. L., Greenville, Mich. 8.
Bowers, L. G., 141 W. 4th St., Dayton, Ohio. 8, 9.
Bowman, John W., Lemoyne, Pa. 6.
Boyd, D. H., 2345 Perrysville St., Pittsburg. 0.
Boyd, G. M., 1909 Spruce St., Philadelphia. 4, 6, 9.
Boynton, P. S., 230 W. 78th St., New York City. 6.
Boys, C. E., 603 Kal. Nat. Bank Bldg., Kalamazoo, Mich. 8.
Bradford, Walter C., Shawnee, Okla. 0.
Bradley, W. J., Cedar Rapids, Ia. 6.
Brandt, A. M., Bismarck, N. Dak. 9.
Brannon, G. D., Crown Point, Ind. 8.
Branson, L. H., Iowa City, Ia. 5, 6, 7, 8.
Braunwarth Emma L., Muscatine, Iowa. 6.
Bray, C. W., 81 Free St., Portland, Me. 6.
Bremmer, H. A., Ashton, Ill. 6, 0.
Brennen, Thomas J., Little Compton, R. I. 6.
Brewer, M. T., DeSoto, Iowa. 8.
Bridgman, J. C., Pocahontas, Iowa. 8.
Briggs, A. B., Ashaway, R. I. 9.
Briggs, H. W., Wilmington, Del. 6, 7, 9.
Broadrup, G. L., Cumberland, Md. 6, 9.
Bronk, E. F., Amsterdam, N. Y. 9.
Brown, C. E., Rossville, Ill. 8.
Brown, Columbus, Herrin, Ill. 0.
Brown, E. M., Tacoma, Wash. 5.
Brown, G. S., Conway, Ark. 8.
Brown, J. Y., Metropolitan Bldg., St. Louis, Mo. 8.
Brown, Percy, 155 Newbury St., Boston. 7.
Browning, C. C., Monrovia, Cal. 8.
Brownwell, F. V., Canajoharie, N. Y. 6.
Bryan, William, West New Brighton, N. Y. 6, 9.
Buchanan, W. A., Hammond, Ind. 8.
Buck, A. W., Fall River, Mass. 4.

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Buell, Mary C., Cumberland, Md. 9.
Bulla, M. S., Richmond, Ind. 8.
Bullard, R. T., 259 Ave. 23, Los Angeles, Cal. 5, 9, 0.
Bull, Maud L., Marion, Ohio. 9.
Bullard, M. J., Putnam, Conn. 6.
Bunn, Ralph A., Dayton, Ohio. 9
Bunting, P. D., Elizabeth, N. J. 9.
Burd, E., Lisbon, Iowa. 8.
Burrage, Walker L., 282 Newbury St., Boston. 6.
Burch, L. E., 150 N. Spruce St., Nashville, Tenn. 6, 9.
Burkhardt, C. F., Effingham, Ill. 0.
Burns, Howard, Carrollton, Ill. 0.
Burns, T. M., 1434 Glenarm St., Denver. 0.
Butz, R. E., York, Pa. 4, 6.
Byall, H. M., Montpelier, Ohio. 8.
Byford, H. T., 1411 E. 51st St., Chicago, Ill. 8, 0.
Byrum, J. M., Shawnee, Okla. 0.

Cadwallader, I. H., 919 N. Taylor Ave., St. Louis. 4, 8, 0.
Camerer, J. D., Kinmundy, Ill. 8.
Campbell, F. J., Fargo, N. Dak. 5.
Campbell, H. C., 345 E. State St., Jacksonville, Ill. 8, 0.
Campbell, O. B., 2001 Faraon St., St. Joseph, Mo. 8.
Cannaday, J. E., Charleston, W. Va. 6.
Cantrell, C. E., Greenville, Texas. 6.
Cape, L. W., Maplewood, St. Louis. 0.
Carley, H. D., 3332 Bell Ave., St. Louis.
Carpenter, M. C., Fairfield, Ia. 8.
Carroll, Jane W., 285 Ashland Ave., Buffalo, N. Y. 6.
Carson, G. W., 4104 Pine St., St., Louis, Mo. 0.
Carstens, J. H., 620 Woodward Ave., Detroit. 4, 5, 6, 7, 9, 0.
Carter, Helen L., 2 Lombardy St., Newark, N. J. 9.
Carver, R. H., Providence, R. I. 4, 6.
Carvill, Lizzie Maud, Somerville, Mass. 6.
Cartwright, Richard, Salem, Ore. 5.
Castle, H. A., Pocatello, Idaho. 5.
Cates, A. B., 2824 Park Ave., Minneapolis. 5.
Cathcart, R. S., 66 Hasell St., Charleston, S. C. 6, 8.
Chalfant, S. A., 5713 Rippey St., Pittsburg, Pa. 0.
Chandler, S., 2010 Chestnut St., Philadelphia. 4, 6, 7, 9.
Chard, Marie L., 616 Madison Ave., New York City. 9.
Chase, W. B., 1050 Park Pl., Brooklyn. 7, 9.
Chason, J. D., Bainbridge, Ga. 3.
Chenery, F. L., Wayne, Me. 6.
Chilton, J. C., Hannibal, Mo. 8.
Cholerton, Herbert, Somerville, Mass. 6.
Chrisman, W. D., Bradford, Ill. 8.
Chumbley, C. A., Rocky, Okla. 0.
Churchill, John Darling, Plymouth, Mass. 6.
Clagett, L. S., Blairsville, Pa. 6.
Clark, E. S., Sumas, Wash. 5.
Clark, John G, 2017 Walnut St., Philadelphia. 4, 6, 9, 0.
Clark, M. T., Temple, Okla. 0.
Clark, S. M. D., 1435 Harmony St., New Orleans, La. 6, 9.
Clark, Margaret V., Waterloo, Iowa. 5.
Clark, O. H., Kalamazoo, Mich. 6.
Cleaves, Margaret A., 616 Madison Ave., New York City. 7.
Clegg, J. T., Siloam Springs, Ark. 0.
Cobb, F. A., 1683 Western Ave., Toledo, Ohio. 8.
Coffman, Walter R., Mohawk Bldg., Portland, Ore. 5.
Cohen, B., 497 Niagara St., Buffalo. 8, 9.
Cole, Lewis G., 103 Park Ave., New York City. 7.
Coles, Stricker, Bryn Mawr, Pa. 4, 9.
Collier, E. L., Roscoe, Pa. 6.
Conard, J. W., Sumner, Mo. 8.
Conaway, W. P., 1723 Pacific Ave., Atlantic City. 4, 9.
Congdon, C. E., 859 Humboldt St., Buffalo. 4, 6.
Conner, A. L., 7056 Main St., Philadelphia. 7.
Cook, Chas. P., New Albany, Ind. 0.
Cook, H. F., 15 Roseville Ave., Newark, N. J. 8.
Cooper, E. M., Carleton, Mich. 8.
Cooper, J. F., 413 Main St., Peoria, Ill. 8.
Cooper, St. Cloud, Fort Smith, Ark. 0.
Copeland, M. A., 721 S. 20th St., Birmingham, Ala. 0.
Cotter, E. J., 301 Shawmut Ave., Boston, Mass. 9.
Cowle, Fannie W., 356 Central Ave., Hot Springs, Ark. 9.
Cox, Edgar, Kokomo, Ind. 8.
Craig, D. H., 386 Commonwealth Ave., Boston. 4, 5, 6, 7, 8.
Craig, N. S., Jennings, La. 8.
Craighead, C. C., Athens, La. 9.
Crain, B. F., Carterville, Ill. 0.
Crawford, Sarah M., 144 Dudley St., Boston. 6.
Cregar, P. B., Plainfield, N. J. 9.
Crist, O. H., 2009 E. Main St., Danville, Ill. 8.
Crosby, Wm. S., 328 S. 17th St., Philadelphia. 9.
Crossen, H. S., 4477 Delmar Ave., St. Louis, Mo. 9, 0.
Crowell, Samuel, 8 Monadnock St., Dorchester, Mass. 6.
Crowley, J. M., Ellsworth, Minn. 8.
Culbertson, Carey, 2854 Washington Blvd., Chicago. 8, 0.
Cullen, T. S., 3 W. Preston St., Baltimore. 4, 6, 7, 8.

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Cunningham, J. W., Stanley, Wis. 8.
Curtis, A. N., 4205 Virginia St., St. Louis. 0.

Da Costa, John C., 1022 Spruce St., Philadelphia. 4, 9.
Dadman, Eliza J., 483 Beacon St., Boston. 8.
Dail, A. W., Cement, Okla. 0.
Damour, F., Bolckow, Mo. 0.
Damron, O. H., Silex, Mo. 0.
Darling, Chas. B., 419 Boylston St., Boston. 6.
Darnall, W. E., 1704 Pacific Ave., Atlantic City. 6, 9.
Darroch, S. C., Cayuga, Ind. 8.
Davenport, J. H., 210 Benefit St., Providence, R. I. 6.
Daubenspeck, C. F., 226 N. Main St., Butler, Pa. 8.
Davidson, H. A., 418 Atherton Bldg., Louisville, Ky. 8.
Davidson, H. S., Woods Block, Akron, Ohio. 8.
Davis, Bessie D., 21 Magazine St., Cambridge, Mass. 6.
Davis, D. W., Wellston, Ohio. 9.
Davis, E. C., Eng. Amer. Bldg., Atlanta, Ga. 0.
Davis, E. N., 120½ Main St., Little Rock, Ark. 0.
Davis, Edward P., 250 S. 21st St., Philadelphia. 6, 7.
Davis, Effa V., 2314 N. Clark St., Chicago. 5, 6.
Davis, Ella M., Holyoke, Mass. 9.
Davis, E. W., Seymour, Conn. 9.
Davis, Fannie, Oil City, Pa. 9.
Davis, J. C., 19 Cumberland St., Rochester, N. Y. 4, 9.
Davis, J. E., 831 Fort St., W., Detroit. 8.
Davis, John D. S., 2031 G. Ave., Birmingham, Ala. 6, 7, 0.
Davis, R. A., 1006 N. State St., Chicago. 8.
Davis, S. R., Lynn, Mass. 6.
Davenport, Francis H., 419 Boylston St., Boston. 6.
Day, Mary Gage, Kingston-on-Hudson, N. Y. 9.
Deal, John C., 3911 Locust St., Philadelphia. 9.
Dean, W. F., Osceola, Iowa. 8.
Dearborn, S. S., Nashua, N. H. 6.
Deaver, John B., 1634 Walnut St., Philadelphia. 7.
Deichmann, O. H., Odd Fellows Bldg., Springfield, Ill. 0.
DeLee, J. B., 5028 Ellis Ave., Chicago. 8.
Denning, Edward J., 216 Broadway, So. Boston. 6.
Dever, H. A., El Reno, Okla. 0.
Dewire, M. V., Sharon, Wis. 8.
Dickes, John T., Portland, Ind. 6.
Dickson, B. V., Covington, Tenn. 8.
Dickson, W. F., 6331 Woodlawn Ave., Chicago. 5, 8.
Dimond, S. B., Albany, Ill. 8.
Doane, Harriet M., Fulton, N. Y. 6.
Doane, Philip S., 1429 N. State St., Chicago. 0.
Dodge, Wm. E., 103 State St., Chicago. 6.
Doederlein, T. J., 752 Fullerton Ave., Chicago. 0.
Doherty, William B., 1520 W. Market St., Louisville, Ky. 7.
Dolley, Gilman C., U. S. A. Hospital, Ft. Leavenworth, Kan. 9.
Donoghue, Francis D., 864 Beacon St., Boston. 5, 6, 7, 9.
Dorland, W. A. N., 126 S. 17th St., Philadelphia. 4, 9.
Dorsett, E. L., 26 Linmar Bldg., St. Louis. 8, 0.
Dorsett, W. B., 5070 Washington Blvd., St. Louis. 4, 5, 6, 7, 8, 9, 0.
Dorsey, F. B., Keokuk, Iowa. 6, 8, 0.
Downs, A. A., Fairfield, Me. 6.
Downs, A. J., 303 Johnson Blk., Los Angeles, Cal. 0.
Drechsler, Louis, 2701 Blair Ave., St. Louis. 0.
Druskin, Samuel J., 214 E. Broadway, New York City. 9.
Dubell, J. E., Columbus, N. J. 9.
Duckering, F. W., 483 Beacon St., Boston. 6.
Duckett, J. D., 2403 Odin Ave., Houston, Tex. 6.
Dudley, E. C., 1545 Astor St., Chicago. 6.
Dummit, Manford, Pierce City, Mo. 0.
Dunlap, Elbert, Wilson Bldg., Dallas, Texas. 0.
Duncan, H. A., 2721 W. Lehigh Ave., Philadelphia. 9.
Dwyer, John E., 878 Mass. Ave., Cambridge, Mass. 6.
Dye, E. A., South Vienna, Ohio. 8.

Earnest, John G., Candler Bldg., Atlanta, Ga. 6.
Eastman, Thomas Barker, 708 Indiana Pythian Bldg., Indianapolis. 5, 8.
Edward, J. T., Wilbur, Wash. 8.
Edwards, William, Bowdle, S. D. 8.
Ehrenfest, Hugo, 4619 McPherson Ave., St. Louis. 0.
Eidmann, Walter P., 3160 Morganford Rd., St. Louis. 0.
Eisenmann, Frank, 212 E. Main St., Louisville, Ky. 8.
Eldred, C. C., Joliet, Ill. 5.
Engle, Perry, Newton, Iowa. 8.
English, C. H., Ft. Wayne, Ind. 8.
Eskey, F. W., Tuscola, Ill. 8.
Estel, G. A., Jacob, Ill. 0.
Estes, O. B., Astoria, Ore. 5.
Evans, F. W., Coos, N. H. 6.
Evans, George B., 17 S. Wilkinson St., Dayton, Ohio. 6.
Evers, Emile T., 1238 Hodiamont Ave., St. Louis. 0.
Ewer, Edward N., Oakland, Cal. 5.

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Fair, Robert P., 481 Beacon St., Boston. 6.
Farquaharson, H. M., 34 Washington St., Chicago. 8.
Farr, E. L., 3 Highland St., Boston. 6.
Ferbert, J. C., California Club, Los Angeles, Cal. 4, 5.
Ferguson, Chas. E., 328 Newton Claypool Bldg., Indianapolis. 5.
Ferrin, Carlisle Franklin, New London, Conn. 6.
Fischer, A. F., Hubbell, Mich. 8.
Fisher, John M., 222 S. 15th St., Philadelphia. 6, 7, 9.
Fisher, V. L., Mt. Vernon, O. 8.
Fisher, W. H., 416 Colton Bldg., Toledo, O. 8.
Fitch, W. H., Rockford, Ill. 8.
Fithian, J. W., 608 Broadway, Camden, N. J. 6, 9.
Fitts, Alston, Tuscaloosa, Ala. 7.
Fleming, Arthur Bowles, Tamaqua, Pa. 6, 8.
Fleming, C. K., California Bldg., Denver. 0.
Flower, W. Z., Gibbon, Minn. 8.
Floyd, J. C. M., 224 N. 5th St., Steubenville, Ohio. 6.
Fluemer, O. C., Tenn. Trust Bldg., Memphis, Tenn. 9.
Fockler, G. W., Delavan, Ill. 0.
Forrest, G. W. K., 1000 Jackson St., Wilmington, Del. 7.
Formad, Marie K., 927 N. Broad St., Philadelphia, 4, 6, 8.
Forster, Davis, Sanford, Fla. 6.
Fort, R. E., 209 N. Vine St., Nashville, Tenn. 6, 9.
Foster, Frank P., 554 W. 114th St., New York City. 9.
Foulkrod, Collin, 4022 Chestnut St., Philadelphia. 0.
Foye, A. Francis, 1118 13th St., Washington, D. C. 9.
Frame, C. N., Ewing, Mo. 0.
Frankenthal, L. E., 4825 Woodlawn Ave., Chicago. 8.
Fraser, J. C., E. Weymouth, Mass. 6.
Frederick, C. C., 64 Richmond Ave., Buffalo, N. Y. 6, 7, 8, 9, 10.
Freeburg, H. M., Watertown, S. D. 8.
Freeman, T. O., Mattoon, Ill. 0.
French, Charles L., 271 High St., Clinton, Mass. 6.
Froehlich, Herman, Hibbing, Minn. 0.
Fry, H. D., 1601 Conn. Ave., Washington, D. C., 4, 6, 7, 8, 9, 10.
Fuchs, Walter H., 3202 Lafayette Ave., St. Louis. 0.
Fuhrmann, R. H., 3221 California Ave., St. Louis. 0.
Furniss, H. D., 393 W. End Ave., New York City. 9

Gageby, L. H., New Castle, Pa. 6, 8.
Gaines, Wm. S., Hillyard, Wash.
Gallager, Harry, Glenolden, Pa. 9.
Gallant, A. Ernest, 540 Madison Ave., New York City. 5, 6, 7, 8, 9.
Garceau, Edgar, 397 Marlborough St., Boston, 6, 7, 8.
Gardner, M. N., Greenleaf, Kan. 0.
Gardner, Wm. S., 6 W. Preston St., Baltimore, Md. 4, 6, 9, 0.
Garland, W. R., 6 Russell St., Plymouth, N. H. 6.
Garrabrant, C., 1001 Atlanta Ave., Alantic City, N. J. 6, 9.
Garver, Bessie J., Iowa Falls, Ia. 8.
Gaston, Ida E., 2833 Diamond St., Philadelphia. 4, 6.
Gaver, W. E., Mt. Airy, Md. 6.
Gay, H. S., 1087 Boylston St., Boston. 6.
Gayler, W. C., 4101 Laclede Ave., St. Louis. 0.
Gehrung, Eugene C., 1368 Downing St., Denver. 0.
Gellhorn, George, Linmar Bldg., St. Louis. 8, 0.
Gilbert, W. H., Evansville, Ind. 0.
Gilcreest, J. Edw., Gainesville, Texas. 5.
Gillespie, G. B., Covington, Tenn. 6.
Girvin, John H., 3912 Walnut St., Philadelphia. 4, 9.
Gilliam, D. Todd, 50 N. 4th St., Columbus, Ohio. 7, 8, 0.
Gillmore, Robert T., 1230 E. 63d St., Chicago. 5, 7, 0.
Glaser, M. J., 1825 S. Jefferson Ave., St. Louis. 0.
Glasgow, Frank A., 3894 Washington Ave., St. Louis. 0.
Gledhill, Henry R., Jerseyville, Ill. 6, 0.
Glidden, C. H., Little Falls, N. Y. 4, 6.
Gobble, H. W., Greenfield, Ill. 8.
Godfrey, W. L., 2 E. Main St., Battle Creek, Mich., 6, 7, 8.
Goffe, J. Riddle, 616 Madison Ave., New York City. 4, 5, 6, 7, 0.
Golden, W. W., Elkins, W. Va. 9.
Goldspohn, A., 2118 Cleveland Ave., Chicago. 4, 5, 6, 7, 0.
Goodrich, Wm. A., Waterbury, Conn. 9.
Goodwin, E. M., 724 E. 105th St., Cleveland, O. 8.
Gordon, Seth C., Fryeburg, Me. 6, 7.
Goss, E. L., Carrington, N. D. 8.
Grad, Herman, 159 W. 120th St., New York City. 6, 7, 9.
Graham, F. A., 15th and O Sts., Lincoln, Neb. 8.
Grant, W. H., 293 Newbury St., Boston. 6.
Graves, W. P., 244 Marlboro St., Boston. 6.
Gray, A. L., Logan Bldg., St. Joseph, Mo. 0.
Gray, C. A., Bonham, Texas. 8.
Gray, D. Frank, 142 Broad St., Providence, R. I. 7.
Greeley, J. T., Nashua, N. H. 6.
Green, B. F., Hillsdale, Mich. 8.

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Green, Charles Montraville, 78 Marlborough St., Boston. 6.
Greene, Mary T., Castile, N. Y. 9.
Greene, Thos. F., 322 Warren St., Boston. 9.
Greer, Bertha A., Lamoni, Iowa. 0.
Griffith, B. B., La Plante Bldg., Vincennes, Ind. 8.
Griggs, Elma C., Ithaca, N. Y. 5.
Grimmer, C. F., Pekin, Ill. 8.
Griscom, Mary W., 253 S. 17th St., Philadelphia. 8.
Grosvenor, W. F., 4829 Kenmore Ave., Chicago. 8.
Ground, Wm. E., Superior, Wis. 5.
Gunn, H. F., Galena, Ill. 8.
Guthrie, J. R., 485 Locust St., Dubuque, Iowa. 4, 5.
Guthrie, W. A., Franklin, Ky. 6.

Hackett, Emma C., Waupella Lodge, Dubuque, Iowa. 8, 9.
Hafford, George C., Albion, Mich. 6.
Hagen-Burger, G. L., 483 Beacon St., Boston. 6.
Hall, C. Lester, 523 Bryant Bldg., Kansas City, Mo. 4, 6, 0.
Hall, Geo. C., 3102 State St., Chicago. 8.
Hall, R. B., Berkshire Bldg., Cincinnati. 9.
Hall, William L., Empire State Bldg., Spokane, Wash. 7.
Hall, W. T., Tarentum, Pa. 8.
Holloway, T. C., Lexington, Ky. 8.
Hamilton, Annie Lee, 657 Boylston St., Boston. 6.
Hamilton, G. L. A., 727 Central Ave., Kansas City, Kan. 8.
Hamilton, M. F., Mannington, W. Va. 0.
Hamilton, S. S., Punxsutawney, Pa. 9.
Hammond, Frank C., 3338 N. Broad St., Philadelphia. 7, 9.
Handley, Walter E., 3516 Pa. Ave., St. Louis. 0.
Hanna, M. A., 515 Commerce Bldg., Kansas City, Mo. 0.
Hanser, H. A., 3651 Delmar Blvd., St. Louis. 0.
Hapgood, L. S., 16 Garden St., Cambridge, Mass. 6.
Hardenbergh, Daniel R., 7 Orchard St., Middletown, N. Y. 6, 7.
Hare, Charles Henry, 483 Beacon St., Boston. 6.
Hargrave, E. T., Protestant Hospital, Norfolk, Va. 6, 0.
Harmann, M. F., 3441 N. 9th St., St. Louis. 0.
Harper, Frances A., 114 W. 4th St., Pittsburg, Kan. 6.
Harper, J. G., 44 N. Church St., Carbondale, Pa. 6.
Harpster, C. M., 705 Madison Ave., Toledo, O. 8.
Harris, Philander A., 453 Park Ave., Paterson, N. J., 6, 7, 9.
Hartley, L. D., Nebo, Mo. 0.
Hartung, Henry, 2615 Sheffield Ave., Chicago. 5, 6, 8, 0.
Harvey, E. M., Media, Pa., 9.
Hasencamp, O., 21 Schmidt Bldg., Toledo, O. 8.
Haskins, Mary G., 270 Woodward Ave., Detroit. 9.
Hawkins, Vincent J., 428 S. Wabasha St., St. Paul. 5.
Hays, W. H., Hannibal, Mo. 0.
Healy, T. R., 8 Charter St., Newburyport, Mass. 6.
Healy, William P., 221 W. 57th St., New York City. 7.
Hedback, A. E., 1006 Donaldson Bldg., Minneapolis. 8.
Heineberg, Alfred, 1642 Pine St., Philadelphia. 9.
Heinecke, Geo. B., 5634 Georgia Ave., N. W., Washington, D. C., 9.
Henkel, Louis B., Jr., 195 Gloucester St., Annapolis, Md. 6.
Henry, W. O., 611 Brandeis Theater Bldg., Omaha. 5, 6.
Herdien, E. F., Martinton, Ill. 5
Herington, Warner, Green City, Mo. 0.
Heritage, C. S., Glassboro, N. J. 8
Herr, H., Washington, Ind. 8.
Herriott, E. L., 323 N. Craig Pl., San Antonio, Texas. 0.
Hetrick, D. J., 54 N. 5th St. Harrisburg, Pa. 4, 6, 7.
Hicks, I. F., Dunn, N. C. 6.
Hielscher, Helen Hughes, Mankato, Minn. 8.
Higgins, C. W., 2 George St., Providence, R. I. 4, 6, 7, 9.
Highsmith, J. F., Fayetteville, N. C. 6.
Hill, C. D., 299 York St., Jersey City, N. J. 6.
Hill, Charles, Pine Island, Minn. 8.
Hill, I. L., 616 Madison St., New York City. 9.
Hill, W. B., 507 3d St., Milwaukee, Wis. 9.
Hinchey, Frank, Humboldt Bldg., St. Louis. 0.
Hipke, G. A., 3021 Cedar St., Milwaukee, Wis. 8, 10.
Hirsch, Samuel, LaSalle, Ill. 8.
Hirschman, L. J., Washington Arcade, Detroit. 8.
Hobbs, Alice L., 217 W. 11th St., Indianapolis. 8.
Hodges, D. M., East Prairie, Mo. 0.
Hodgins, Arthur G., 242 Beretania St., Honolulu, Hawaii. 9.
Hodgson, Frederick G., 319 Century Bldg., Atlanta, Ga. 7, 8.
Hoffman, C. S., Keyser, W. Va. 0.
Hoffman, J. L., Ashland, Pa. 4, 5.
Hofmann, Ottokar, 407 Argyle Bldg., Kansas City, Mo. 7.
Holland, S. Z., Paducah, Ky. 0.
Holmes, Rudolph W., 1347 N. State St., Chicago. 4, 8.
Holt, E. E., 1536 Franklin Ave., St. Louis. 0.
Holte, H., Crookston, Minn. 8.
Hoornbeck, N. B., Youngstown, Ill. 8.

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Hopkins, J. N., Burnt Prairie, Ill. 8.
Hopkins, M. J., 3558 Lindell Blvd., St. Louis. 0.
Horrell, C. B., Galesburg, Ill. 8.
House, Chas. F., Painesville, Ohio. 6.
Howard, Chas. E., Benton, Ky. 0.
Howe, J. D., 53 Union St., Pittsfield, Mass. 6.
Howell, W. H., 831 6th Ave., Altoona, Pa. 9.
Hubbard, H. V., 420 Central Ave., Plainfield, N. J. 6.
Huggins, Walter L., 1626 Ingraham St., Los Angeles, Cal.
Huggins, R. R., 483 S. Atlantic Ave., Pittsburg, Pa. 0.
Hull, Edw. T., 2420 7th Ave., New York City. 0.
Humiston, Wm. H., Rose Bldg., Cleveland, Ohio. 4, 6.
Humphrey, J. F., 58 Phila. St., Saratoga Springs, N. Y. 4, 6.
Hunner, Guy L., 2305 St. Paul St., Baltimore. 4, 6, 7, 9.
Hunt, Ernest L., 771 Main St., Worcester, Mass. 6.
Hupp, F. L., Wheeling, W. Va. 8.
Huson, Florence, 506 Cass Ave., Detroit. 4, 6, 7.
Hutchinson, C. P., 88 Central St., Auburndale, Mass. 6.
Hyde, Harriet Baker, Greenwich, Conn. 6.
Hynes, B. M., 2005 Victor St., St. Louis. 0.

Ickes, E. M., Fremont, Ohio. 6.
Ihne, A. J., Fosterburg, Ill. 8.
Ill, Charles L., 180 Clinton Ave., Newark, N. J. 7.
Ill, Edw. J., 1002 Broad St., Newark, N. J. 9.
Ingalls, G. H., 126 Paul Gore St., Jamaica Plain, Mass. 6.

Jacob, Louis H., Philadelphia. 9.
Jacobs, A. C., Elmore, Minn. 8.
Jacobus, Arthur M., 131 70th St., New York City. 6.
Jacobson, Henry, 705 Olive St., St. Louis. 0.
Jacobson, J. H., 239 Michigan St., Toledo. 0.
Jack, Harvey P., Canisteo, N. Y. 4, 6, 7, 8, 9.
Jackson, A. J., Matawan, N. J. 6.
Jackson, Daniel F., Jenkins Bldg., Pittsburg. 7.
Jamieson, R. C., 147 Park Ave., Detroit. 4, 6.
Janson, S. A., Chicago. 8.
Jeffries, W. G., Leon, Iowa. 8.
Jenkins, J. T., Carthage, Ill. 8.
Johnson, Burt C., 1404 Main St., Buffalo, N. Y. 9.
Johnson, F. P., 3744 Finney Ave., St. Louis. 0.
Johnson, G. A., Moberly, Mo. 0.
Johnson, H. L. E., 1821 Jefferson Pl., N.-W., Washington, D. C. 4, 5, 7, 9, 0.
Johnston, J. A., 66 Hollester St., Cincinnati. 0.
Johnson, Joseph Taber, 1728 K St., Washington, D. C. 7.
Johnson, Ray H., 449 Franklin St., Buffalo, N. Y. 7.
Johnson, W., 49 Chapel St., Augusta, Me. 6.
Johnson, W. S., 304 Story Bldg., Los Angeles, Cal. 8.
Johnston, J. A., 66 Hollester St., Cincinnati. 5, 6.
Jonas, A. F., Brandeis Bldg., Omaha. 5.
Jones, David N., Gaylord, Minn. 5.
Jones, E. H., Weyauwega, Wis. 8.
Jones, J. D., Groton, S. D. 8.
Jones, Margaret M., 2329 S. Trumbull Ave., Chicago. 8.
Jones, Mary Scott, 1070 Boylston St., Boston. 6.

Kaan, G. W., 162 Aspinwall Ave., Boston. 6.
Kahn, Maurice, 4624 S. Ashland Ave., Chicago. 8, 0.
Kane, Elizabeth, 11 S. 2d St., Memphis, Tenn. 8.
Kasten, W. C., Fort Madison, Ia. 0.
Keefer, Jane R., Sterling, Ill. 8.
Keehn, G. A., 2702 N. Grand Ave., St. Louis. 0.
Keim, Wm. F., 7 Roseville Ave., Newark, N. J. 9.
Keller, Franklin J., 379 Totawa Ave., Paterson, N. J. 9.
Keller, J. G., 209-10 Wayne Bldg., Toledo, Ohio. 8.
Kelley, J. Thomas, 1312 15th St., N. W., Washington, D. C. 6.
Kelly, Howard A., 1418 Eutaw Pl., Baltimore. 4, 6, 9.
Kelly, J. W., 507 E. Monroe St., Springfield, Ill. 0.
Kelly, W. D., Lowry Arcade, St. Paul, Minn. 8.
Kemble, C. C., 619 W. 8th St., Erie, Pa. 7.
Kendell, H. W., Covington, Ohio. 0.
Kennedy, Bernays, 25 Willoughby Bldg., Indianapolis. 0.
Kenton, J. R., Raymond, Ill. 0.
Kepler, C. O., 362 Commonwealth Ave., Boston. 0.
Kercher, Delno E., 1534 Pine St., Philadelphia, Pa. 7.
Kern, L. C., Waverly, Iowa. 6.
Kerr, Wm., Randolph, Iowa. 0.
Kershner, F. O., Clinton, Iowa. 8.
Kerwin, W., 4900 Laclede Ave., St. Louis. 0.
Keyes, J. J., 226 17th St., Brooklyn. 9.
Kidder, F. T., Woodstock, Vt. 6.
Kieffer, Alonzo R., 4268 N. Belle Place, St. Louis. 4, 6.
Kier, W. F., 3609 Lindell Blvd., St. Louis. 0.
Kight, R. S., 272 Granby St., Norfolk, Va. 6.
Kimball, A. C., 822 N. Grand Ave., St. Louis. 0.
Kimball, F. H., 206 S. Main St., Rockford, Ill. 8.
Kimball, Z. V., Hillsboro, Ill. 8

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Kimbrough, W. C., Denton, Tex. 8.
Kinnear, C. H., 602 S. O St., Tacoma, Wash. 7.
Kirk, T. T., 4908 Liberty Ave., Pittsburg, Pa. 6.
Kirton, J. R. W., Phoenix, Mich. 0.
Knickerbocker, H. J., 196 Genesee St., Geneva, N. Y. 7.
Knight, F. J., Charlotte, Mich. 8.
Konikow, M., 56 Brunswick St., Boston. 6.
Koons, Philip R., 58 W. Main St., Mechanicsburg, Pa. 9.
Kosmak, G. W. 23 E. 93d St., New York City. 6, 7, 9.
Kremer, N. A., Madison, Ind. 8.
Krum, A. G., 163 W. 18th St., Erie, Pa. 6.
Krusen, Wilmer, 127 N. 20th St., Philadelphia. 4, 9.
Kurtz, R. L., Neoga, Ill. 8.

Lambert, De Forest, Tyngsboro, Mass. 6.
Landry, G. E., Oldtown, Me. 6.
Langworthy, S. B., Ryan Bldg., Leavenworth, Kan. 8.
Lanoie, J. E., 88 St. Dennis St., Montreal, Canada. 6.
Lanoutte, J. E. A., 224 Laurel St., Manchester, N. H. 6.
Larsen, L. A., Colfax, Wis. 5.
Lattin, Cora B., 2075 Main St., Buffalo. 0.
Lawrence, F. F., 328 E. State St., Columbus, Ohio. 4, 5, 6, 7, 0.
Leavitt, John F., 522 N. 3d St., Camden, N. J. 9.
LeClere, J. E., Lesueur, Minn. 8.
Lee, W. G., 1251 Wilson Ave., Chicago. 6, 8.
Leech, J. S., Glasgow, Ky. 8.
Leigh, C. W., 3578 Sheffield Ave., Chicago. 8.
Lemen, Harry R., Commercial Bldg., Alton, Ill. 5.
Leof, M. V., 498 N. 4th St., Philadelphia. 9.
Leonard, C. H., 827 2d Ave., Detroit.
Leonard, Charles L., 112 S. 20th St., Philadelphia. 7, 8.
Leonard, Homer O., 1115 Grand St., Kansas City, Mo. 0.
Leonard, Milton H., 83 Ash St., S., New Bedford, Mass. 6.
Leslie, Jas. F., Mannie, Ill. 0.
Lessig, J. A., Schuykill Haven, Pa. 9.
Lewis, Bransford, Century Bldg, St. Louis, Mo. 7.
Lewis, H. F., 4426 Lake Ave., Chicago. 8.
Lewis, W. E., Seaside, Ore. 5.
Liell, E. N., 140 W. Monroe St., Jacksonville, Fla. 4, 6, 7, 9.
Lindley, Walter, 1414 S. Hope St., Los Angeles, Cal. 5.
Lipes, H. Judson, 178 Washington Ave., Albany, N. Y. 6, 8.
Litzenberg, J. C., 3137 Park Ave., Minneapolis. 6, 8.
Livermore, W. H., Chickasha, Okla. 8.
Locke, Eva M., 11 Amherst St., Nashua, N. H. 6, 7.
Lockhart, Joseph S., 837 Mass. Ave., Cambridge, Mass. 6.
Lockrey, Sarah H., 1520 Vine St., Philadelphia. 4, 8, 9.
Longaker, Daniel, 1402 N. 16th St., Philadelphia. 6, 7, 8.
Long, F. A., Madison, Neb. 8.
Long, Judson H., E. Moline, Ill. 0.
Longeay, S. M., Fayetteville, Ill. 0.
Longenecker, C. B., 3416 Baring St., Philadelphia. 4, 6, 9.
Loomis, E. E., Janesville, Wis. 6.
Lothrop, Earl P., 153 Delaware Ave., Buffalo, N. Y. 9, 0.
Lowder, Rosa E., Maquoketa, Iowa. 8.
Luburg, L. F., 1822 Girard Ave., Philadelphia. 9.
Luzader, Katherine B., Greenville, Ill. 0.
Lynam, T. P., 3959 W. Madison St., Chicago. 8.
Lynch, F. W., 100 State St., Chicago. 8.
Lynch, Jerome M., 58 W. 59th St., New York City. 7.
Lynch, R. J., 52 Courtland St., Bridgeport, Conn. 6.
Lyons, J. A., 4118 State St., Chicago. 8.
Lyons, James H., Lumber Exchange, Seattle, Wash. 5.

McAlexander, R. O., 320 N. Meridian St., Indianapolis. 6, 7, 0.
McCallin, A. E., Hancock, Wis. 0.
McCarroll, H. R., Walnut Ridge, Ark. 0.
McCay, Mary, Sunbury, Pa. 8.
McCleave, T. C., 2200 Bancroft Way, Berkeley, Cal. 5.
McClellan, George W., 47 Main St., Canandaigua, N. Y. 7.
McCowen, Jennie, 218 W. 3d St., Davenport, Iowa. 8.
McCracken, R. W., Union Grove, Wis. 8.
McCrimmon, F. W., Butte, Mont. 6.
McCullough, G. T., Higgins Block, Missoula, Mont. 5, 0.
McCully, C. H., 421 4th St., Logansport, Ind. 8.
McCune, M. Virginia. Martinsburg, W. Va. 4, 0.
McDonald, Ellice, 174 W. 58th St., New York City. 7, 9.
McDougald, John Q., 1336 Lombard St., Philadelphia. 9.
McEwen, Mary G., Evanston, Ill. 0.
McFee, W. D., Haverhill, Mass. 6.
McGann, Peter J., Marthasville, Mo. 0.
McGlinn, John A., 113 20th St., Philadelphia. 9.
McGowen, T. J., Vincennes, Ind. 0.
McGuire, M. F., Montpelier, Vt. 0.
McHugh, J. E., Fort Wayne, Ind. 8.

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McKay, W. T., Arkansas, Kan. 8.
McKee, E. S., 916 Nassau St., Cincinnati. 5, 6, 7, 8, 0.
McKeeman, R. B., 2020 Broadway, Ft. Wayne, Ind. 8.
McKenney, D. C., 1250 Main St., Buffalo, N. Y., 9.
McKenzie, Wm., Conshohocken, Pa. 8.
McLaren, J. L., 648 E. 28th St., Oakland, Cal. 8.
McLean, Mary H., 4339 Delmar Ave., St. Louis. 0.
McLurg, John, 620 Madison Ave., Bay City, Mich. 8.
McMenamin, F. J., Highland Falls, N. Y. 9.
McMurray, R. J., St. Francisville, Ill. 0.
McMurtry, L. S., 4 Ormsby Pl., Louisville, Ky. 4, 5, 6, 7, 8, 0.
McNutt, Julia G., 126 State St., Albany, N. Y. 0.
McNutt, Sarah J., 265 Lexington Ave., New York City. 9, 0.
McParlan, John P., 1039 Madison Ave., New York City. 9.
McPherson, George E., 40 Bank St., Attleboro, Mass. 6.
McPherson, Ross, 37 Madison Ave., New York. 8, 9, 0.
McRoberts, W. J., Hot Springs, S. Dak. 0.
McSweeney, J. E., 207 Main St., Hartford, Conn. 6.
McVeigh, Jas. A., 406 Fine Arts Bldg., Detroit, Mich. 9.
Macfarlane, Catharine, 5808 Greene St., Philadelphia. 9.
Mackey, A. N., Aledo, Ill. 0.
Mackintosh, M. Alexander, 237 Broadway, Paterson, N. J. 7
Macpherson, J. D., Akron, N. Y. 8.
Maertz, Charles, 1409 Elm St., Cincinnati. 9.
Maley, W. H., Galesburg, Ill. 8.
Mallett, G. H., 244 W. 73d St., New York City. 9.
Manchester, Hiram B., Batavia, N. Y. 6.
Manion, Katherine C., 918 Corbett Bldg., Portland, Ore. 5.
Mann, Fred W., Houlton, Me. 6.
Manton, W. P., 52 W. Adams Ave., Detroit. 4, 5, 6, 7, 8, 9, 0.
March, E. J., 322 S. Cleveland Ave., Canton, Ohio. 4, 9, 0.
Marcy, Henry O., 180 Commonwealth Ave., Boston. 4, 6, 7, 8, 9, 0.
Marshall, Clara, 258 S. 16th St., Philadelphia. 0.
Marshall, N. M., 655 Congress St., Portland, Me. 6.
Marshall, R. J., E. Liverpool, O. 9.
Martin, F. H., 103 State St., Chicago. 6.
Martin, Elizabeth L., 329 S. Dallas Ave., Pittsburg, Pa. 4, 9.
Martindale, Joseph W., 2303 Federal St., Camden, N. J. 7, 9.
Martine, Angeline, 325 Genesee St., Utica, N. Y. 9.
Marvel, Emery, 811 Pacific Ave., Atlantic City, N. J. 7.
Marvell, Mary W., 243 Highland Ave., Fall River, Mass. 6.
Marx, Ella, 4161 Washington St., St. Louis. 0.
Mason, C. H., 619 Tower Ave., West Superior, Wis. 5.
Massey, G. Betton, 901 Professional Bldg., Philadelphia. 4, 6, 7, 9, 0.
Mastin, N. W., Wellsboro, Pa. 6.
Mathews, Wm. J., 1009 Garden St., Hoboken, N. J. 9.
Mattox, E. L., Swope Blk., Terre Haute, Ind. 8.
Matchette, W. H., Hancock, Mich. 5.
Mayberry, E. N., 67 Pleasant St., So. Weymouth, Mass. 6.
Mayland, M. L., 210 Central Ave., Faribault, Minn. 8.
Max, C. O. C., 2020 S. 12th St., St. Louis. 0.
Mayes, J. A., Denison, Texas. 0.
Meek, Edward, Little Rock, Ark. 0.
Mershon, G. E., Mt. Carroll, Ill. 8.
Metcalf, W. F., 636 Woodward Ave., Detroit. 6, 7, 8.
Michinard, Paul, Audubon Bldg., New Orleans. 3, 5.
Mikkelson, Agnes, 1943 N. Kedzie Ave., Chicago. 8.
Miles, Clarence C., Greenport, N. Y. 9.
Miller, Aaron B., 326 Montgomery St., Syracuse, N. Y. 6, 7.
Miller, C. Jeff, 1638 Joseph St., New Orleans. 6, 7, 8, 9, 0.
Miller, G. Brown, 1730 K. St. N. W., Washington, D. C. 9.
Miller, Harold A., 219 6th St., Pittsburg, Pa. 9.
Miller, J. D., Norfolk Bldg., Cincinnati. 8.
Miller, J. F., Palmer, Ill. 8.
Miller, S. M., 209 Church St., Knoxville, Tenn. 9.
Miller, V. A., Lake Arthur, La. 8.
Miller, W. E., Columbus, Ill. 8.
Mills, Henry M., 192A 6th Ave., Brooklyn. 6, 7, 9.
Miner, Elizabeth R., Macomb, Ill. 0.
Minnassian, H. A., Flynn Bldg., Des Moines, Iowa. 8.
Missimore, L. E., 4969 Page Ave., St. Louis. 0.
Mitchell, John H., Mt. Vernon, Ill. 0.
Mitchell, Robert L., 2112 Maryland Ave., Baltimore. 9.
Monagan, Chas. A., 140 Grand St., Waterbury, Conn. 9.
Monash, D. F., 3601 Vincennes Ave., Chicago. 6, 8.
Montgomery, E. B., Box 128, Quincy, Ill. 8, 0.
Montgomery, E. E., 1703 Walnut St., Philadelphia. 4, 5, 6, 7, 8, 9, 0.
Montgomery, E. S., 109 Stratford Ave., Pittsburg. 4, 6.
More, C. W., Eveleth, Minn. 8.
Morehouse, G. G., Owatonna, Minn. 8.

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Moore, A. A., 48 E. 31st St., New York. 4, 6.
Moore, G. W., Munger, Mich. 8.
Moore, P. G., Mannington, W. Va. 0.
Moore, B. W. 3634 Wash. Blvd., St. Louis. 0.
Morris, Frank, 1122 Leighton Ave., Los Angeles, Cal. 5.
Morris, Lewis C., 716 N. 18th St., Birmingham, Ala. 4, 5.
Morris, Lewis, Stockport, Iowa. 0.
Morrison, Arthur A., 1702 Bull St., Savannah, Ga. 7.
Morton, R. J., Green, Kan. 5
Mosher, Eliza M., 44 Court St., Brooklyn. 9, 0.
Mosher, Geo. Clark, 605 Bryant Bldg., Kansas City, Mo. 9.
Mullan, E. A., 1811 W. 21st St., Chicago. 8.
Munch, Louise L., 110 Ottawa St., Joliet, Ill. 8.
Munday, Bert, 367 W. 23d St., New York City. 6.
Murphy, Edward M., 295 Central St., Lowell, Mass. 6.
Murphy, Francis C., 1609 Tremont St., Boston. 6.
Murphy, J. C., 4263 Morgan St., St. Louis. 0.
Murray, Grace Peckham, 50 W. 45th St., New York City. 6.
Myers, J. F., Decatur, Ala. 0.

Neale, R. A., 1169 La Salle Ave., Chicago. 4, 6, 7.
Neff, G. R., Farmington, Iowa. 0.
Nelson, D. T., 2400 Indiana Ave., Chicago. 2, 6, 8.
Nelson, N. C., 1968 Lincoln Ave., Chicago. 8.
Neufeld, F., 1430 W. 3d St., Davenport, Iowa. 8.
Newbecker, Minerva M., Ord, Neb. 6.
Newell, A. J., 623 W. 120th St., Chicago. 5.
Newell, F. S., 379 Beacon St., Boston. 6.
Newman, Henry P., 1560 8th St., San Diego, Cal. 4, 6, 0.
Newman, J. W., 3516 Prytania St., New Orleans. 0.
Newman, Percy, 4175 Morgan St., St. Louis. 0.
Nichols, John W., Farmington, Maine. 6.
Nielson, Chas. P., 1509 Locust St., Philadelphia. 4, 6, 7.
Nielson, E. B., 543 Boylston St., Boston. 6.
Noble, Sarah A., Clearwater, Kan. 0.
Noble, Thomas B., 427 Newton Claypool Bldg., Indianapolis, Ind. 6.
Noer, Julius, Stoughton, Wis. 8.
Norris, R. C., 500 N. 20th St., Philadelphia. 4, 9.
Novak, Emil, 830 Patterson Park Ave., Baltimore, Md. 9, 0.
Nowlen, J. A., Morrison, Ill. 8.
Nute, Marion, 36 Centre St., North Dorchester, Mass. 6.
Nysewander, Christian, 1154 14th St., Des Moines, Iowa. 8.

Offutt, Lemuel, Greensburg, Pa. 9.
Ogle, Oliver L., St. Louis. 0.
O'Sullivan, John J., 340 Haverhill, Lawrence, Mass. 6.
Oelke, E. H., Wheaton, Ill. 8.
Oliver, A. H., Edwardsville, Ill. 0.
Olsen, S. H., Milaca, Minn. 0.
Onstott, E., Saltsburg, Pa. 8.
Osborne, Henry M., 1825 Oak Hill Ave., Youngstown, Ohio. 9.
Otis, E. F., Battle Creek, Mich. 7.
Oyen, A. B., 1522 N. Rockwell St., Chicago. 4, 5, 6, 8.
Oyler, H. S., Lincoln, Ill. 0.

Page, W. A., Barlow, Ky. 8.
Paddock, C. E., 3622 Michigan Ave., Chicago. 6.
Paine, A. K., 366 Commonwealth Ave., Boston. 6.
Palmerlee, G. H., 30 Columbia St. W., Detroit. 8.
Panton, J. J., Macleay Bldg., Portland, Ore. 5.
Pantzer, H. O., 88 Woodruff Pl., Indianapolis. 4, 5, 6, 7, 8, 9, 0.
Parke, Wm. E., 1739 N. 17th St., Philadelphia. 4, 9.
Parker, G. A., Southampton, Pa. 4, 9.
Parman, David R., 4473 Delmar Ave., St. Louis.
Parmlee, Wm. J., 108 Calhoun St., Springfield, Mass. 6, 8.
Parmeter, Roland L., 720 Jefferson Ave., Detroit, Mich. 6.
Parr, S. M., Carthage, Ill. 8.
Parrish, Geo., Medical Bldg., Portland, Ore. 0.
Parsons, Mary, 1216 H St., N. W., Washington, D. C. 6.
Partridge, H. G., 371 Broad St., Providence, R. I. 6.
Paschall, J. B., Fulton, Ky. 0.
Pattison, H. A., 502 Trust Bldg., Rockford, Ill. 8.
Patton, Chas. L., Ill. Nat. Bank Bldg., Springfield, Ill. 0.
Pavlik, O. S., 1900 Millard Ave., Chicago. 8.
Peables, A. M., Auburn, Me. 6.
Peabody, F. B., Richmond, Me. 6.
Pearce, W. J., Dodgeville, Wis. 8.
Pease, E. A., 443 Beacon St., Boston. 6.
Peck, Elizabeth L., 4113 Walnut St., Philadelphia. 7.
Peck, Geo. A., New Rochelle, N. Y. 0.
Peckardt, Kate E., 411 W. 63d St., Chicago. 8.
Peery, Trusten P., Yuba City, Cal. 5.
Pedigo, S. E. G., Marshfield, O. 8.
Penn, Geo. T., 1928 E. Sprague Ave., Spokane, Wash. 5.
Perekhan, J. S., 2600 Indiana Ave., Chicago. 8.
Perry, Alexander, Jr., 406 N. Weber St., Colorado Springs, Colo.

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Peterman, A. L., Parker, S. D. 8.
Peterson, Rueben, Ann Arbor, Mich. 6, 7, 9, 0.
Petry, Wm., 325 S. Orange Ave., Newark, N. J. 4, 5.
Pfaff, O. G., 338 Newton Claypool Bldg., Indianapolis. 6, 7.
Phifer, C. H., 3658 Wentworth Ave., Chicago. 8.
Pitts, Herman C., 210 Benefit St., Providence, R. I. 6, 9.
Platt, J. S., 913 Military St., Port Huron, Mich. 6.
Polak, John O., 287 Clinton Ave., Brooklyn. 4, 6, 7, 9.
Polk, W. M., 7. E. 36th St., New York City. 6.
Porter, Wm. D., 2527 Gilbert Ave., Cincinnati. 7.
Potter, Ellen C., 5138 Wayne Ave., Philadelphia. 7.
Potter, I. W., 420 Franklin St., Buffalo, N. Y. 9, 0.
Potter, Marjory J., 437 3d St., Niagara Falls, N. Y. 0.
Potter, Marion Craig, 1487 South St., Rochester, N. Y. 9.
Potter, W. W., 238 Delaware Ave., Buffalo, N. Y. 6, 9.
Potts, F. L., Toluca, Ill. 0.
Poucher, J. Wilson, 339 Mill St., Poughkeepsie, N. Y. 6.
Powell, Cuthbert, 1632 Welton St., Denver. 9.
Powell, Ignatius W., Grand and Easton Ave., St. Louis. 0.
Powell, James M., Granite Block, Spokane, Wash. 5.
Powers, F. H., 34 Washington St., Chicago. 8.
Price, A. D., Harrodsburg, Ky. 2, 4, 6.
Price, Joseph, 241 N. 18th St., Philadelphia. 4, 6, 7.
Pringle, W. N., 413 Locust St., Johnstown, Pa. 3, 4, 5.
Puls, A. J., Wells Bldg., Milwaukee, Wis. 8.
Purinton, H. H., Kennebunk, Me. 6.
Purnell, Caroline M., 132 S. 18th St., Philadelphia. 4, 9.
Putney, George E., Paynesville, Minn. 6.
Putt, Maurice O., Oberlin, Pa. 9.

Quayle, John H., 1110 Euclid Ave., Cleveland, Ohio. 9.

Raab, Ernest P., 301 S. High St., Belleville, Ill. 7, 0.
Rafferty, H. N., Robison, Ill. 5, 6.
Rambo, D. T., Chillicothe, Ia. 8.
Randle, H. T., Clayton, Mo. 0.
Ray, E. S., Hamden Jct., O. 8.
Raymer, Henry S., Cedar Rapids, Iowa. 5.
Read, A. J., R. F. D. No. 1, Battle Creek, Mich. 8.
Read, Flora A., Fond du Lac, Wis. 8.
Reddick, J. T., Paducah, Ky. 6, 7.
Redfield, C. I., 42 E. Main St., Middletown, N. Y. 4, 6.
Reed, Charles A. L., 2824 Melrose Ave., Cincinnati. 6, 9.
Reeks, T. Eben, 25 Court St., New Britain, Conn. 6.
Rees, Charles M., 89½ Wentworth St., Charleston, S. C. 6.
Reese, F. D., Cortland, N. Y. 4, 6.
Regar, H. K., 1909 N. 13th St., Philadelphia. 4, 5, 6.
Renaud, J. T. U., 5021 Cottage Grove Ave., Chicago. 8.
Ressler, G. W., 1009 Center St., Ashland, Pa. 9.
Reynolds, Chas. B., 2003 Diamond St., Philadelphia. 9.
Reynolds, E., 321 Dartmouth St., Boston, Mass. 6, 7.
Reynolds, G. P., Alameda, Cal. 5.
Rhodes, W. R., 201 E. Main St., Toledo, Ill. 8.
Ricardo, D. E., 4624 Vincennes Ave., Chicago. 8.
Rice, Dell Frank, 5145 Cabanne Ave., St. Louis. 0.
Rice, E. E., Shawnee, Okla. 8.
Richards, J. N., Fallsington, Pa. 9.
Richardson, Emma M., 581 Stevens St., Camden, N. J. 4, 9.
Richman, E. M., 248 Mulberry St., Newark, N. J. 8.
Richmond, W. W., Clinton, Ky. 5.
Ries, Emil, 100 State St., Chicago. 0.
Riley, Elizabeth A., 310 Bay State Rd., Boston. 6.
Risk, Winthrop A., State Home and School, Providence, R. I. 9.
Ritter, Caleb A., 702 Bryant Bldg., Kansas City, Mo. 0.
Ritter, Ella N., 1217 W. 4th St., Williamsport, Pa. 5.
Robb, Hunter, Rose Bldg., Cleveland, Ohio. 8.
Robbie, Mary King, Hicks Bldg., San Antonio, Texas. 0.
Roberts, Cora B., Syndicate Arcade, Minneapolis, Minn. 6.
Robinson, J. B., Mt. Vernon, Ia. 8.
Robinson, J. F., Manchester, N. H. 6.
Rodl, C. H., Calumet, Mich. 8.
Rodman, W. W., Pierce City, Mo. 0.
Rogers, H. C., Primghar, Ia. 8.
Rogler, Henry O., Mason City, Ill. 0.
Rose, F. M., Gooding, Ida. 5.
Rose, Frances E., 218 Paulsen St., Spokane, Wash. 5.
Rosenthal, Max., 26 W. 90th St., New York City. 9, 0.
Ross, D. C., 1430 Lipscomb St., Fort Worth, Tex. 9.
Rothrock, J. L., 235 Lowry Arcade, St. Paul, Minn. 6, 7, 0.
Rotter, Chas. F., 1910 Arsenal St., St. Louis. 0.
Royster, H. A., Tucker Bldg., Raleigh, N. C. 6.
Rubin, Geo., 92 State St., Chicago. 8.
Rumpf, William H., Faribault, Minn. 5.

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Rusk, Elizabeth, 4241 Delmar Blvd., St. Louis. 0.
Russell, J. M., Monett, Mo. 8.
Russell, Rose A., Granite City, Ill. 0.
Russell, Wm. W., 1208 Eutaw Pl., Baltimore. 4, 9.
Ryan, Granville N., 312 Citizens' Bank Bldg., Des Moines, Iowa. 7.
Ryland, C. T., Lexington, Mo. 0.

Sadler, Lena K., 100 State St., Chicago. 8.
Sahlender, Otto L., 321 W. Grand Ave., St. Louis. 0.
Sampson, John A., 180 Washington St., Albany, N. Y. 4, 6, 0.
Samuels, A., 2003 McCulloh St., Baltimore. 8.
Sanders, T. C., 22½ E. Main St., Shawnee, Okla. 8.
Sanders, W. H., 154 St. Francis St., Mobile, Ala.
Sands, T. E., 220 W. Main St., Battle Creek, Mich. 0.
Sanes, K. I., 519 Jenkins Bldg., Pittsburg. 4, 6, 7, 9, 0.
Saunders, Charles A., Taylor Bldg., Norfolk, Va. 6.
Saunders, George, 1303 Tower Ave., Superior, Wis. 8.
Sawyer, Chas. J., Windsor, N. C. 9.
Scanland, J. M., Warm Springs, Mont. 8.
Scanlan, Thomas J., 65 McLennan St., Dorchester, Boston. 6.
Scarnecchia, Joseph, 259 E. Federal St., Youngstown, Ohio. 9.
Sears, Frederick W., 709 S. Warren St., Syracuse, N. Y. 7.
Schaefer, P. H., Carpenter Bldg., Burlington, Iowa. 8.
Scheel, A. M., Belleville, Ill. 0.
Schenck, B. R., 502 Washington Arcade, Detroit. 8, 9.
Scherck, Henry J., 309 Century Bldg., St. Louis, Mo. 6.
Schick, M. F., 401 Washington Blvd. W., Ft. Wayne, Ind. 8.
Schiller, Heliodor, 4705 Woodlawn Ave., Chicago. 8.
Schlosstein, A. G., 3153 Longfellow Blvd., St. Louis. 0.
Schmeling, A. F., Columbus, Wis. 9, 0.
Schmidt, Marie, 3210 W. 22nd St., Chicago. 8.
Schoenberg, Albert J., 2432 Lincoln Ave., Chicago. 0.
Schowalter, V. M., Pt. Clear, Ala 8.
Schroeter, Ludwig, 415 Franklin St., Buffalo, N. Y. 9.
Schuffell, H. M., 314 S. Cleveland Ave., Canton, Ohio. 6.
Schulz, Edward, 1725 S. 7th St., St. Louis. 0.
Schulze, George, 428 S. Oak St., Owatonna, Minn. 8.
Schultz, Samuel, Cold Water, Mich. 8.
Schumann, Edward A., 15 Pelham Rd., Philadelphia. 6, 9.
Schwarz, Henry, 440 N. Newstead Ave., St. Louis, Mo. 9, 0.
Schweikart, Fredk. J., 26 Victor Pl., Elmhurst, N. Y. 9.
Scott, James M., Fairmount Ave., St. Louis. 0.
Scull, L., Eleanor, 168 S. Hohman St., Hammond, Ind. 8.
Scull, Wm. B., 3024 Richmond St., Philadelphia. 9.
Seegar, J. K. B. E., 1529 Park Ave., Baltimore. 9.
Seiss, F. H., Taneytown, Md. 9.
Sellers, I. J., Bank Bldg., Birmingham, Ala. 6, 7.
Sellman, W. A. B., 5 E. Biddle St., Baltimore. 4, 6, 7.
Seymour F. E., Fort Dodge, Iowa. 5.
Shafer, H. O., 1201 N. Clark St., Chicago. 0.
Shafer, Winfield S., Rochester, Ind. 0.
Shanahan, T. J., 11 Harvard St., Brookline, Mass. 6.
Shawl, J. L., Onarga, Ill. 0.
Shelly, E. T., 6th and Commercial Sts., Atchison, Kan. 5.
Shepherd, Vincent, 45 Whitaker St., Dupont, Ind. 8.
Sherman, B. H., Dexter, Iowa. 8.
Shillito, Nicholas, 501 Diamond Bank Bldg., Pittsburg, Pa. 4, 8.
Shimer, Sterling D., 313 Buskill St., Easton, Pa. 9.
Shlenker, Milton A., 3804 St. Charles Ave., New Orleans. 0.
Shobe, H. G., Jefferson City, Mo. 8.
Shoemaker, G. E., 1831 Chestnut St., Philadelphia. 4, 6, 7, 9, 0.
Shoop, Frederic J., 230 St. James Pl., Brooklyn. 9.
Short, R. B., Union Mills, Ind. 0.
Shuell, T. J., Parnell, Iowa. 8.
Sichler, E. H., 508 Fine Arts Bldg., Detroit. 8.
Siggins, James B., 217 Center St., Oil City, Pa. 7, 8.
Sights, H. P., Asylum, Hopkinsville, Ky.
Sigmond, Harvey W., Crawfordsville, Ind. 0.
Silver, M. E., 530 Brush Ave., Detroit. 8.
Simms, B. B., Talladega, Ala. 6.
Simpson, F. F., 1112 Bessemer Bldg., Pittsburg, Pa. 4, 6, 7, 9, 0.
Singer, Jacob Jesse, 1027 N. 11th St., St. Louis. 0.
Sisler, G. W., Water Valley, Miss. 6.
Skeel, R. E., 314 The Osborn, Cleveland, Ohio. 6.
Skinner, Cynthia A., 605 Laughlin Bldg., Los Angeles, Cal. 8.
Sledge, W. H., 113 St. Joseph St., Mobile, Ala. 9.
Slocumb, Maude S., 3615 Fremont Ave. N, Minneapolis, Minn. 8.
Small, W. B., 2232 Green St., Philadelphia. 9.
Smith, Cassar, 903 W. State St., Olean, N. Y. 9.

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Smith, Clarence A., 719 Cobb Bldg., Seattle, Wash. 5.
Smith, Clarance D., 741 Spruce St., Philadelphia. 7.
Smith, Frederick Le Roy, Chatfield, Minn. 0.
Smith, H. W., Roodhouse, Ill. 0.
Smith, L. S., Gypsy, W. Va. 0.
Smith, Lorin W., 12 East Hill St., Wabash, Ind. 7.
Smith, Richard R., Grand Rapids, Mich. 9, 0.
Smith, W. S., Boul. and W. 3d St., Dayton, Ohio. 8.
Smouse, D. W., 319 6th Ave., Des Moines, Iowa. 6.
Snow, Albert G., Eitel Bldg., Seattle, Wash. 5.
Somers, George B., 2662 Vallejo St., San Francisco. 5.
Somers, John E., 1979 Mass Ave., Cambridge, Mass. 6.
Spain, Kate E., 5715 Etzel Ave., St. Louis. 0.
Spalding, Otis B., 166 Gear St., San Francisco, Cal. 5.
Speidel, C. E., 1292 Cherokee Rd., Louisville, Ky. 8.
Sperry, Mary A., 402 Kittridge Bldg., Denver. 5.
Spiller, Wm. H., 307 Second Ave., New York City. 9.
Spofford, H. M., 90 Main St., Batavia, N. Y. 6.
Sprague, W. B., Palmyra, Mich. 8.
Sprigg, W. M., The Rochambeau, Washington, D. C. 4, 8.
Springer, Willard, 810 Washington St., Wilmington, Del. 6.
Spurney, A. F., 403 Osborn Bldg., Cleveland, Ohio. 9.
Stack, C. F., 139 W. River St., Hyde Park, Mass. 8.
Stafford, R. H., Sumner, Ia. 8.
Stafford, T. J., Stockton, Ill. 8.
Stahl, Alfred, 550 Bergen St., Newark, N. J. 9.
Starbird, Edward P., 9 Monadnock St., Boston. 6.
Starring, Anna M. F., 795 Trumbull Ave., Detroit. 0.
Steedly, B. B., Spartanburg, S. C. 9.
Stein, Arthur, 1 W. 85th St., New York City. 9.
Stein, Newton H., Middleport, Pa. 9.
Stein, Geo. W., 506 Astor St., Norristown, Pa. 9.
Steiner, D. W., S.-W. cor. High and Main Sts., Lima, Ohio. 8.
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